Covering the TI99/4A and the Myarc 9640

MICROpendium

Volume 8 Number 8 | September 1991 | $2.50

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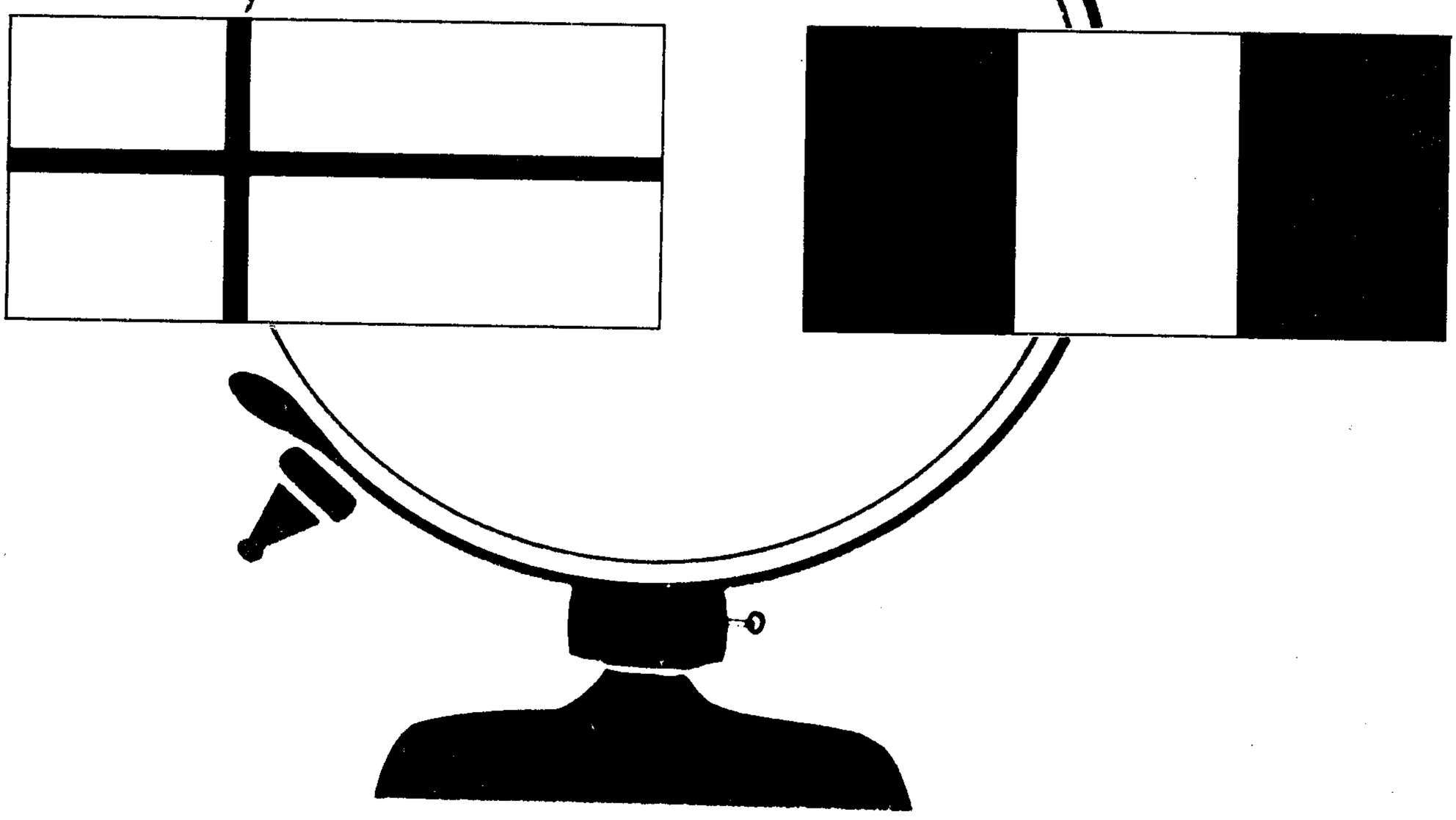

Flags of Europe — Page 27

Also: Playing musical notes in BASIC
Lotteries in Extended BASIC
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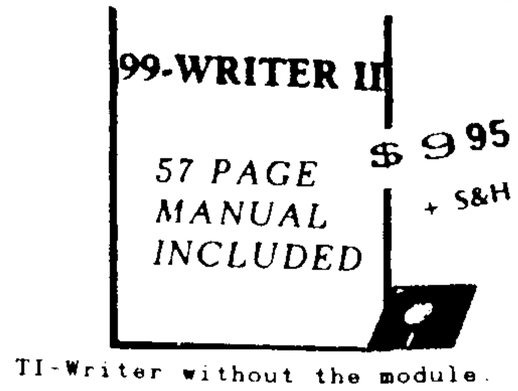

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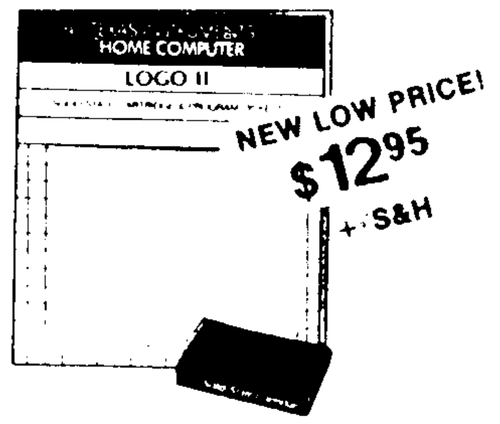

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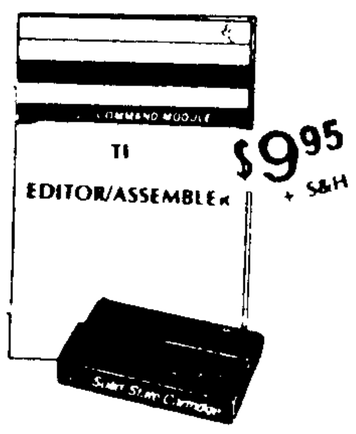
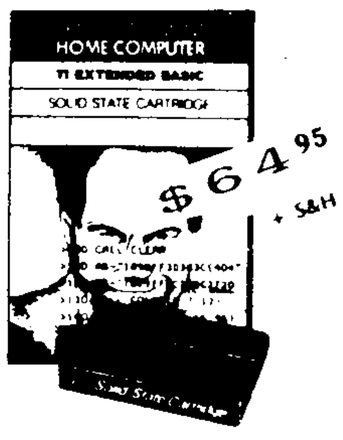


Editor/Assembler

This is the **complete** version with manual, module, program disk and the disk version of Tombstone City as an example of assembly language programming. 32k and disk drive are required. This package will allow you to program the 99/4A in TMS 9900 Assembly Language and gives you access to all system features. Provides the fastest speed possible from the 16-bit processor!



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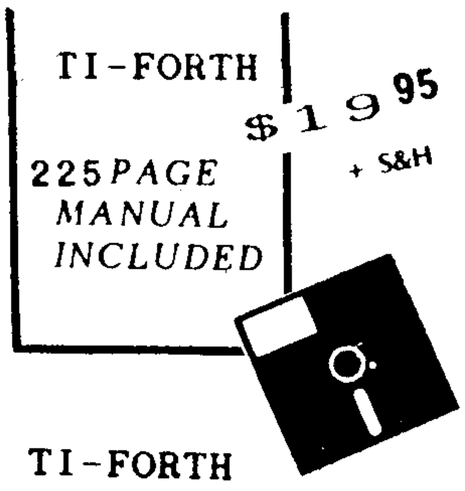

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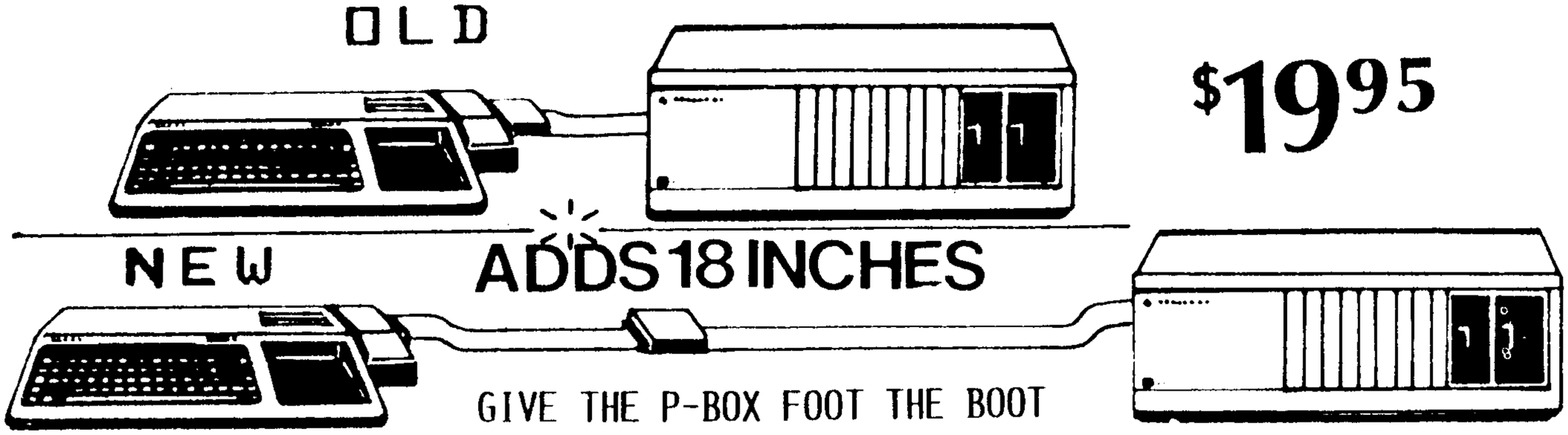

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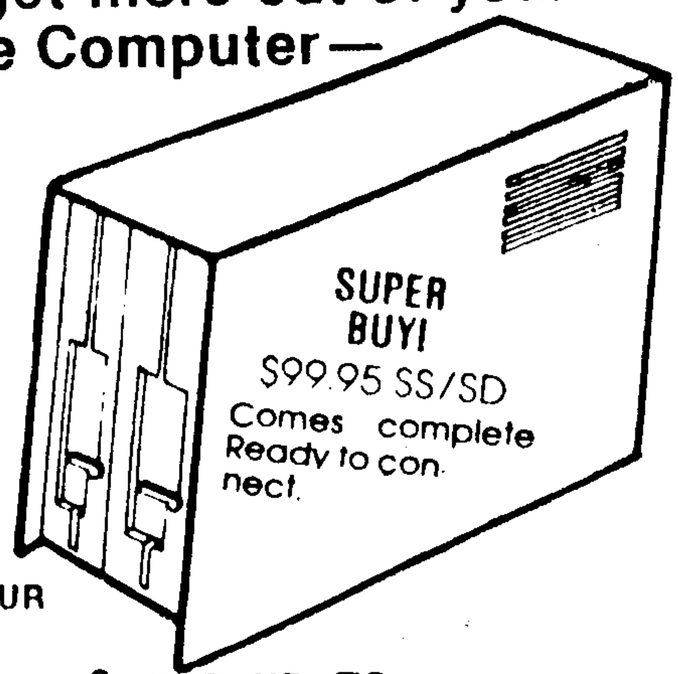

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*READ THIS

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 was published in the October 1987 edition.
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.

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Comments

Good news (I hope) on Myarc repairs

Here's the news from my source at Myarc: Users of Myarc's hard and floppy disk controller who have sent them in for repair — including MICROpendium — may expect to get them back this month. This is what I was told in late August, unofficially, of course. Those with a Geneve waiting to be repaired can expect the wait to continue. Geneve's are more difficult to repair because the the multi-layered boards being used. (Jim Uzzell, our Geneve columnist, is one of those who has been waiting for months for the computer to be repaired. Sorry, Jim.)

Jack Riley, formerly with Myarc, has not been working with the company for the past 18 months. Riley answered some questions recently on Delphi and reported that he'd been helping Myarc customers during the past 18 months out of a sense of loyalty. Riley revealed that he has never been a partner in Myarc and that no work has been done on streamer tape backup software since he left.

COFFEY TO DISTRIBUTE GEN-TRI

Good news for TI and Geneve users who have been trying to order software from JP Software. Jerry Coffey has entered into an agreement with J. Peter Hoddie to distribute JP Software products, including the newly released Gen-Tri for the Geneve. Coffey says he will work with buyers who never received items they ordered, but that the first product he will handle is Gen-Tri. (Gen-Tri is a multi-function program that includes a word processor, terminal emulator and disk manager.) For more information, see Newsbytes elsewhere in this issue.

NEW PRODUCTS ON THE HORIZON

TI and Geneve users can expect to see a number of new products this fall, many of which may make their debut at the Chicago TI fair. Primarily, the products will be software, including titles ported over from other computer systems.

—JK

Feedback

A diehard speaks

Just a short note to tell you how much I appreciate your efforts to keep the TI99ers abreast of all the latest products available in the ever-changing marketplace.

Since I, along with a lot of other users, do not program, we have to depend on people like you to keep us abreast of the latest items available.

Some people think I am a hardhead for not going to a (shudder) IBM clone. However, I prefer to call myself a diehard. I just happen to feel that I have the best machine going, for the money. I have some friends with clones, and I am not impressed. I am able to obtain programs that do what I want to do, and a lot less expensive.

Harold Mayo
Sperry, Oklahoma

Annoyed with JP

In the nine or so years I have been involved with the TI community I've tried very hard always to be positive and not find fault with any group, person or vendor that made an effort to support our computer. I am sorry to have to report that this letter will change all that.

JP Software has become, in my opinion, among the most irresponsible businesses that I have had the misfortune to deal with. Right now, JP owes me Triad, First Base Utilities and AV-Indexer. I have been waiting for a copy of AV-Indexer (that works) since September 1989! I ordered and paid for FirstBase Utilities at Fest-West '91 in Anaheim and was foolish enough to send JP another $23 for Wayne Stith's Triad program a month or so later.

After not having received FirstBase Utilities I called JP Software and talked to Mr. J. P. Hoddie *in person*. I was "assured" that the order for all three products would be shipped "within the week." *Wrong!*

It is now 23 months since I sent AV-Indexer back asking for a copy that would load, six months since I paid for FirstBase Utilities and five months since I sent my money (and the check was cashed) in for Triad. *Still no software!*

I am *really* getting impatient! No one has a right to be that irresponsible and be called a business. If my experiences are typical, I urge all 99ers to reconsider *any* planned purchases from JP Software, unless of course you are willing to gamble that the product *will* show up in a couple of years.

Bill Gaskill
Grand Junction, Colorado

Other individuals have had problems, but JP Software now has a new distributor. You can read about it elsewhere in this issue. — Ed.

Mouse problems

I have been a loyal TI owner and user for approximately seven years.

Last year, early May to be exact, I read an advertisement in your magazine for the Asgard Mouse. I subsequently ordered the product. I was told that the product would be shipped out the next day by UPS. However, two weeks had elapsed and I had not yet received the new mouse. I contacted Asgard at the end of the third week and they insisted that it had indeed been shipped the next day after I placed the order. I received the package at the end of the third week.

Shortly after I purchased the mouse I noticed that it seemed to "miss" key presses. I called Asgard with this complaint and they were aware of this problem. They informed me that an upgraded version of the control software would be shipped to me and the other mouse owners by the end of the month.

Consequently, I went along with them. On June 2, 1990, I ordered the Asgard Mouse Developers Package for $14.95.

Over a year has passed. I have not received the upgrade nor the Developers Package.

After three months of waiting, I called Asgard again. After several attempts I reached them. They said they would check on my order and get back with me.

I have called numerous times, each time receiving the same story, "We're not sure what happened, but we'll get back to you."

I have totaled more than $10 in phone calls to Asgard over the last year, not to mention the original $14.95 price of the package or the mouse that is almost impossible to program because of its "missing" of keypresses.

If anyone can provide me with any help in this matter it would be greatly appreciated.

Denver Earl Sullivan
Osgood, Indiana

As we went to press, we received a notice that the Mouse Development Package was being released and shipped as of Aug. 25. Hope your problems have been solved. — Ed.

Disappointed reader

I have just received my July issue of MICROpendium and am very disappointed. First of all I noticed that there were only 32 pages in this issue. You had been running 40 pages lately. When I first subscribed to MICROpendium it regularly had 48 pages. I hope the greatly reduced number of pages is not permanent.

Secondly I was greatly disturbed to see two good columnists end their efforts. I have greatly enjoyed Harry Brashear's columns but agree that a conflict of interest is to be avoided. I wish him the best of luck and hope you can find a replacement of equal wit. Why is Bill Gaskill closing up shop? The fact that his column is over and his software is no longer being sold is a good indicator of this. I for one would be disappointed.

Thirdly, I thought your article on the "Accelerator" was not very good. Perhaps it was the best possible in a short time but I still was disappointed. I'm sure that OPA will supply your reviewer with a loaner board to help facilitate a review. An idea for an article might be to compare all the chips in the 9900 family. Go into some detail on pin-outs, code compatability between chips, memory management, etc. (I didn't even know the 99000 family existed.) Also, the differences between the 9918, 38, 58 and 9978. I would like to see more hardware construction projects. I was a great fan of "Ciarcia's Circuit Cellar" in *BYTE* and would like to see the same thing for the TI, Geneve and probably the Accelerator.

Frank Gehrling
Oakland, Maine

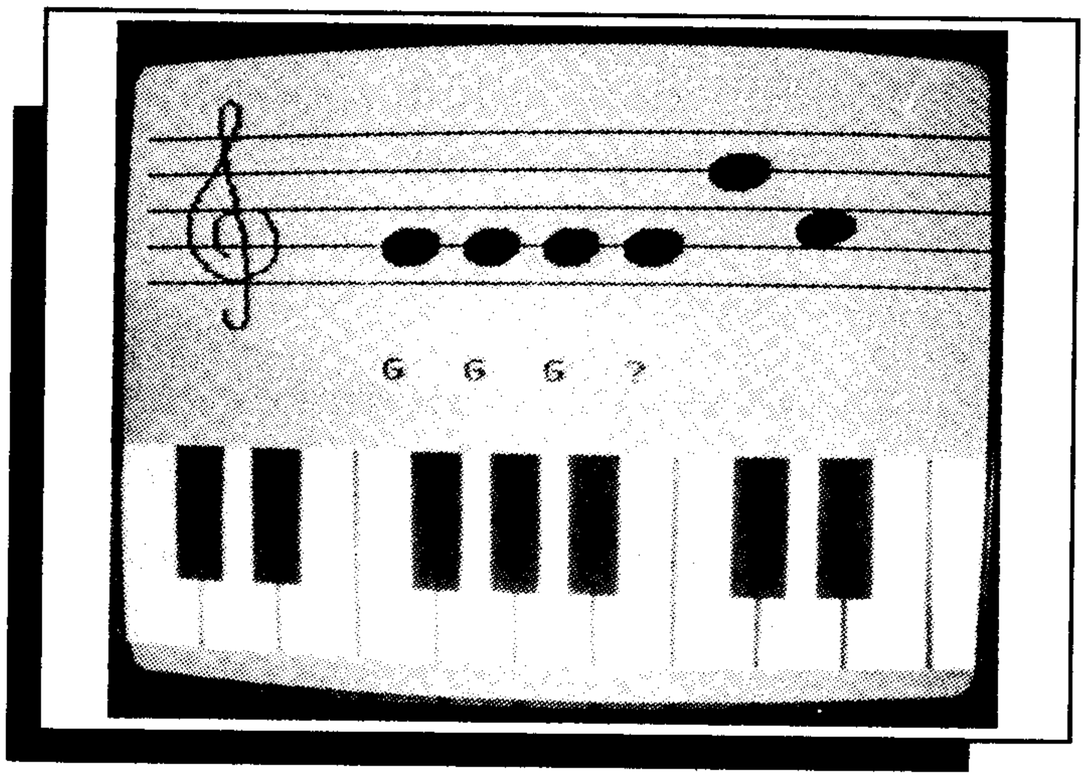
***The Feedback column is a forum for TI99/4A and Geneve users. The editor will condense submissions when necessary to conserve space. We ask readers to restrict themselves to one subject for the sake of simplicity. Mail Feedback items to* MICROpendium, P.O. Box 1343, Round Rock, TX 78680.**

BASIC

Playing musical notes

By REGENA

Earlier this year I started teaching piano lessons again. I also took a look at some of the early music education programs I wrote. One of the first programs I wrote was learning the names of the notes on the keyboard, on the treble clef and on the bass clef. Another simple program I wrote showed two notes on the staff, then the student would have to indicate stepping up or stepping down or staying the same.



I noticed a couple of my new students knew the note names for notes on the musical staff but did not know where the note was located on the piano. The program this month shows a treble staff on the upper part of the screen. The lower part of the screen has a keyboard (with Middle C at the left). Six notes are chosen randomly and shown on the staff. The student must "play" the notes on the keyboard.

To play a note, the left arrow key or right arrow key is used to move the indicator on the keyboard, then the ENTER key is pressed. The name of the note appears on the key selected. If it is not the correct key for the note printed, the student must try again. If it is the correct key, the tone sounds and the name of the note is printed under the note as well as on the key. The computer then goes on to the next note.

By having more than one note on the screen at a time, the student may be able to see intervals, or moving up or down the keyboard from one note to the next.

After the six notes are played, the notes are cleared and six new notes are chosen and displayed.

To quit, press the "Q" key whenever the keyboard indicator is blinking.

Lines 290-330 read in data for the notes. For each of the 10 possible notes, S(C) is the row on the staff where the note will appear, N$ is the note name, K(C) is the column on the keyboard for the key, GR(C) is the beginning graphic character for drawing the note, and NS(C) is the frequency for sounding the note.

The musical staff is drawn using characters 96 and 97 in the subroutine in Lines 1200-1280 or in Lines 530-570. The treble clef charactes are defined in Lines 340-450 and are placed on the screen in Lines 580-660.

The keyboard is drawn with characters 48-51 and the subroutine in Lines 1060-1190.

A note consists of four graphic characters. The subroutine Lines 1290-1420 draws the note. A note may be one of two different kinds of notes on a space. GR(C) is needed for the beginning graphic character for one of the four kinds of notes. Also, Middle C needs a leger line, so it is drawn in Lines 1300-1310. The note D next to Middle C is also drawn slightly differently (a space note without lines at the bottom of the note), so Lines 1390-1410 draw it. Some of the space notes need an extra two characters on top to make the oval shape, and these characters are drawn in Lines 1360-1380.

Lines 670-750 randomly choose the six notes and draw them one at a time in a FOR-NEXT loop with T as the counter. NOTE is the random number from 1 to 10, then ROW, COL and G are determined from S, T and GR. PLAY(T) is stored for each of the six notes for the quiz to follow.

PR is the print row and PC is the print column for the note name printed under the notes on the staff. KR is the row on the keyboard where the indicator will appear. XC is the column for a particular key.

Lines 770-1020 perform the quiz for the six notes. A key pressed by the student must be Q to quit, ENTER to choose a particular key, or the left arrow key (S) or the right arrow key (D). All other keys pressed are ignored.

Line 930 prints the name of the key chosen on the piano keyboard. Line 940 checks to see whether the key is correct for the note drawn above. If it is correct, Line 970 plays the tone, and Line 980 prints the name of the note. Line 990 increments PC, the printing column.

After the quiz of six notes, Lines 1030-1040 clear the notes on the staff by redrawing the staff, then the program branches back to Line 670.

If you wish to save typing effort, you may have a copy of this program by sending $4 to *REGENA, 918 Cedar Knolls West, Cedar City, UT 84720.* Please indicate that you need "Playing Notes" for the TI and whether you want cassette or diskette.

PLAYING NOTES

```
100 REM PLAYING NOTES !151
110 REM BY REGENA !071
120 CALL CLEAR !209
130 PRINT "  ** PLAYING NOTE
S **" !093
140 CALL CHAR(38,"FFFF7F3F")
!185
150 CALL CHAR(39,"FEFCF0C")!
120
160 PRINT : :"NOTES WILL APP
EAR ON THE" !093
```

(See Page 9)

REGENA ON BASIC—

(Continued from Page 8)

```
170 PR=12 !141
180 KR=23 !138
190 PRINT :"TREBLE STAFF.  P
LAY THE NOTE" !129
200 XC=2 !084
210 CALL COLOR(3,2,16)!228
220 PRINT :"BY MOVING THE LE
FT OR RIGHT" !105
230 CALL CHAR(51,"")!158
240 CALL CHAR(48,"FFFFFFFFFF
FFFFFF")!020
250 PRINT :"ARROW KEY, THEN
PRESS THE" !238
260 CALL CHAR(49,"0101010101
010101")!189
270 CALL CHAR(50,"8080808080
80808")!188
280 PRINT :"<ENTER> KEY." !0
83
290 FOR C=1 TO 10 !099
300 READ S(C),N$(C),K(C),GR(
C),NS(C)!029
310 NEXT C !217
320 DATA 10,C,2,129,262,9,D,
5,121,294,8,E,8,135,330,7,F,
1,125,349,7,G,14,129,392,6,
A,17,121,440 !152
330 DATA 5,B,20,135,494,4,C,
23,125,523,4,D,26,129,587,3,
E,29,121,659 !000
340 FOR C=96 TO 138 !222
350 READ C$ !254
360 CALL CHAR(C,C$)!081
370 NEXT C !217
380 DATA FF,00000000FF,01818
18181C2623C,FF01010101010101
,0101010101010FF,02020202FF
0202C2,FFF8080804040404 !166
390 DATA 2020202010101010,80
808080FF40404,0202020202020202
02,0000000000010202,00000000
C020101 !197
400 DATA 1010101020202020,
FF2080808,02020404FF08102,20
40808,0000000001010202,FF040
4040404040404 !163
410 DATA 04040404FF020201,80
402020180403,0101020418608,8
0808080FF80808,FF18040402020
101 !152
420 DATA FF00010204040404,04
040404FF0201 !018
430 DATA FF071F3F7FFFFFFF,FF
F8FEFFFFFFFFF,FFFF7F3FFF,FE
FCF0C0FF,00000000FF071F3F,00
000000FFF8FEFF !146
440 DATA 7FFFFFFFFFFF7F3F,FF
FFFFFFFEFCF0C,1F3F7FFFFFFFF
FF,FEFFFFFFFFFFFFFE,7F3F0F,F
CF8E,FF00000000000007 !053
450 DATA FF000000000000F8,00
0003071F3F7FFF,0000F0F8FEFFF
FFF,FFFFFFFF7F3F0F,FFFFFFFEF
CF8E !089
460 PRINT : :"PRESS <Q> TO Q
UIT." !171
470 PRINT : :"PRESS ANY KEY
TO START." !033
480 CALL KEY(3,KEY,ST)!176
490 IF ST<1 THEN 480 !062
500 CALL CLEAR !209
510 CALL SCREEN(8)!153
520 GOSUB 1070 !130
530 CALL HCHAR(3,2,96,31)!18
0
540 CALL HCHAR(4,2,97,31)!18
2
550 CALL HCHAR(6,2,96,31)!18
3
560 CALL HCHAR(7,2,97,31)!18
5
570 CALL HCHAR(9,2,96,31)!18
6
580 REM CLEF !244
590 RESTORE 640 !223
600 FOR C=1 TO 24 !104
610 READ X,Y,G !245
620 CALL HCHAR(X,Y,G)!155
630 NEXT C !217
640 DATA 10,5,98,9,5,99,8,5,
100,7,5,101,6,5,102,5,5,103,
4,5,104,3,4,99,2,4,105,1,4,1
06,1,5,107 !156
650 DATA 2,5,108,3,5,109,4,4
,110,5,4,111,5,3,112,6,3,113
,7,3,114,8,4,115,8,6,116,7,7
,117,6,6,118 !250
660 DATA 6,4,119,7,4,120 !20
7
670 FOR T=1 TO 6 !072
680 RANDOMIZE !149
690 NOTE=INT(10*RND+1)!176
700 ROW=S(NOTE)!172
710 COL=8+3*T !113
720 G=GR(NOTE)!065
730 PLAY(T)=NOTE !235
740 GOSUB 1300 !105
750 NEXT T !234
760 PC=11 !125
770 FOR T=1 TO 6 !072
780 NOTE=PLAY(T)!235
790 CALL HCHAR(PR,PC,63)!011
800 CALL KEY(3,KEY,ST)!176
810 CALL HCHAR(KR,XC,42)!011
820 CALL HCHAR(KR,XC,51)!011
830 IF KEY=13 THEN 930 !119
840 IF (KEY=81)+(KEY=113)THE
N 1430 !020
850 IF (KEY<>83)+(KEY<>115)+
(KEY<>136)=-3 THEN 890 !243
860 IF XC=2 THEN 800 !116
870 XC=XC-3 !178
880 GOTO 800 !114
890 IF (KEY<>68)+(KEY<>100)+
(KEY<>137)=-3 THEN 800 !151
900 IF XC=29 THEN 800 !174
910 XC=XC+3 !177
920 GOTO 800 !114
930 CALL HCHAR(KR,XC,ASC(N$(
INT((XC+1)/3))))!194
940 IF XC=NOTE*3-1 THEN 970
!212
950 CALL SOUND(300,-4,2)!222
960 GOTO 800 !114
970 CALL SOUND(900,NS(NOTE),
1)!104
980 CALL HCHAR(PR,PC,ASC(N$(
NOTE)))!054
990 PC=PC+3 !161
1000 CALL SOUND(1,9999,30)!1
57
1010 CALL HCHAR(KR,XC,51)!01
1
1020 NEXT T !234
1030 CALL HCHAR(10,7,32,90)!
227
1040 GOSUB 1210 !014
1050 GOTO 670 !239
1060 REM KEYBOARD !043
1070 CALL HCHAR(16,1,51,9*32
)!165
1080 RESTORE 1090 !163
1090 DATA 3,6,12,15,18,24,27
 !179
1100 FOR C=3 TO 30 STEP 3 !0
21
1110 CALL VCHAR(16,C,49,9)!0
17
1120 CALL VCHAR(16,C+1,50,9)
!196
1130 NEXT C !217
```

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REGENA ON BASIC—

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```
1140 FOR C=1 TO 7 !056
1150 READ X !239
1160 CALL VCHAR(16,X,48,6)!0
34
1170 CALL VCHAR(16,X+1,48,6)
!221
1180 NEXT C !217
1190 RETURN !136
1200 REM STAFF !078
1210 CALL HCHAR(3,8,96,24)!1
88
1220 CALL HCHAR(4,8,97,24)!1
90
1230 CALL HCHAR(5,8,32,24)!1
80
1240 CALL HCHAR(6,8,96,24)!1
91
1250 CALL HCHAR(7,8,97,24)!1
93
1260 CALL HCHAR(8,8,32,24)!1
83
1270 CALL HCHAR(9,8,96,24)!1
94
1280 RETURN !136
1290 REM NOTE !016
1300 IF NOTE>1 THEN 1320 !02
6
1310 CALL HCHAR(10,COL-1,97,
4)!082
1320 CALL HCHAR(ROW,COL,G)!1
92
1330 CALL HCHAR(ROW,COL+1,G+
1)!054
1340 CALL HCHAR(ROW+1,COL,G+
2)!055
1350 CALL HCHAR(ROW+1,COL+1,
G+3)!243
1360 IF G<>129 THEN 1390 !15
t individual results." !017
820 CALL PAUSE :: GOTO 150 !
079
27675 SUB PRESENTVAL(P,R,N,P
V)!147
27680 ! Present value of ann
uity(payment,rate(eg .08),n,
return variable)JLS 9/91 !12
7
27685 PV=P*(1-(1+R)^-N)/R+.0
05 !085
27690 PV=INT(PV*100)/100 ::
SUBEND !175
28040 SUB KEYAT(R,C,X,V$)!21
7
28045 ! KEYAT(Row, Column, A
SCII Return variable, Valida
tion string) JLS 2/91 !033
28050 ! Combines cursor flas
h with single key entry, val
idation !111
28055 C=C+2 :: CALL GCHAR(R,
C,N(0)):: N(1)=N(0):: N(2),N
(3)=30 !163
28060 CALL HCHAR(R,C,N(Y-INT
(Y/4)*4)):: Y=Y+1 !209
28065 CALL KEY(3,X,S):: IF S
<1 THEN 28060 !095
28070 IF POS(V$,CHR$(X),1)=0
 THEN 28060 !120
28075 CALL HCHAR(R,C,X)!144
28080 SUBEND !168
30820 SUB PAUSE !236
30825 FOR D=1 TO 100 :: NEXT
 D !241
30830 DISPLAY AT(24,1):" PRE
SS ANY KEY TO CONTINUE" !120
30835 CALL KEY(0,K,S):: IF S
<1 THEN 30835 !049
30840 SUBEND !168
31195 SUB DUMP(PR$)!214
31200 !DUMP(printer name) te
xt screen dump v.2; JLS !100
31205 OPEN #9:PR$ !025
31210 FOR R=1 TO 24 :: A$=""
 :: FOR C=1 TO 32 :: CALL GC
HAR(R,C,X)!221
31215 A$=A$&CHR$(X):: NEXT C
 :: PRINT #9:A$ :: NEXT R !2
15
31220 CLOSE #9 :: SUBEND !20
1
31565 SUB TITLE2 !035
31575 DISPLAY AT(7,11)ERASE
ALL:"NUMBERS" :: CALL CHAR(9
5,"00FF"):: CALL HCHAR(8,13,
95,7)!175
31580 DISPLAY AT(12,2):"Lott
ery Game Loss Predictor" !13
9
31590 DISPLAY AT(19,4):"Sept
. 1991 Jerry Stern" !139
31595 SUBEND !168
```

EXTENDED BASIC

Lotteries and the expectation of profit

By JERRY STERN
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Right now, the television stations in Maryland are all singing a song: "The Maryland Lottery, it could be you!" Maybe it could be any one of us that wins, but it doesn't seem likely. After all, state-run lotteries are a major source of funds across the nation, usually bringing in about one-half of ticket sales as revenues after expenses and winnings. If a casino had a "house percentage" of 50 percent, it would be boycotted by all the gamblers; but lotteries are blessed by the state, and so they can run up the hopes of their players while draining down their wallets.

There are several different types of lotteries, and most states run several different games at once. Lotto is the game that allows gamblers to choose about six or seven numbers from a group of numbers, perhaps 1 to 40 or 1 to 74, and the jackpot, based on ticket sales, is shared among those gamblers who guessed all the numbers correctly.

Another type of game, called the "numbers" game, allows gamblers to pick a three- or four-digit number, and choose to bet that that number will be chosen, with

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the digits in or out of order, and with fixed-amount prizes.

Finally, instant games offer instant satisfaction for the gambler, with no drawing, but just a scratch-off patch on the ticket to find out what they haven't won. This month's program calculates how badly the odds are in favor of the house, er, state for numbers games and instant games. Lotto game odds are calculated differently, and we'll look at those separately, next month.

Part of the marketing of the games includes changing the games frequently, or keeping them fresh. Changes are made frequently to make the game appear to have more prizes, or bigger prizes, or better odds, than the last version of the game. The instant games change constantly, although certain game schemes seem to occur repeatedly across the nation. This past summer, Maryland and Pennsylvania both ran variations of the "Joker's Wild" instant game. Each change in the games affects not only the prize amounts, but also the odds of winning those prizes.

The most useful way to calculate whether any particular game has become more or less favorable to the purchasers is to calculate what probability and statistics experts call the expectation, or the expected winnings on a single ticket. That is the average amount that a gambler will win on a lottery ticket if the game is played over a very long time. For lotteries, these numbers become reliable for numbers of tickets up in the millions, so these calculations will tell which games are likely to lose the least money for a gambler, but not how long that loss will take. Statistics can predict very large numbers extremely well, moderately-large numbers tolerably well, and small numbers or individual winnings not at all, so NUMBERS is only a comparison tool, and not intended to help you win the lottery. (The only way to win is not to play.)

The expected winnings for a bet is equal to the sum of each possible win for the game, each divided by the odds of winning that prize. For a simple example, if you and I each place a dollar in a betting pool so that, when we roll a die, you collect the pool if no faces below four appear, then my expected winnings on the dollar bet will be three chances out of six to win $2, plus three chances out of six to win nothing. The total is $1, equal to the bet, so the expectation is $1. When the expectation is equal to the bet, the game is even, and has a house percentage of zero.

Let's try it with two dice, and the same bet. I can win with two low numbers in 9 chances out of 36 for $2, or one low number in 18 chances out of 36, or lose with no low numbers in 9 rolls out of 36. The expectation is 27/36 times two dollars, or $1.50. The house percentage (that's me, or the state lottery commission) is 50 percent, and the bet is what is generally called a sucker bet.

To calculate the expected winnings for a ticket, you will need to know all the possible ways to win a prize on a ticket. On a numbers game, that could mean straight, boxed, front pair, or sometimes superstraights, or other combinations, and on an instant game, the combinations could be anything from a royal flush to a home run, so it is easiest to refer to them as a $2. win, or $25. win, or a free ticket. The ways of winning, and the odds for each way, are listed on the lottery brochure for that game, usually available near the lottery sales machine, or always from the state lottery board or commission. With that brochure ready, run NUMBERS.

NUMBERS has three options available on the menu. Option 3 will show you a help screen; it's not enough to replace reading these instructions, but it's enough to jog your memory. Option 2 will calculate how much a big prize is really worth. The million dollar prizes, and above, are generally paid out over twenty years, and the lotteries purchase these annuities from banks for considerably less than millions of dollars. NUMBERS calculates how much those annuities are worth in today's dollars. You'll need to know the amount of the prize, how many years the prize will be distributed over, and the current interest rate being paid on bonds. Don't use NUMBERS to calculate present values on other annuities — lottery annuities include the first payment made by the lottery, and the remainder by the bank, but normal annuities make their first payment one year later. The subprogram PRESENTVAL, on

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lines 27675 to 27690, can calculate normal annuities if you use it in a program that asks for the amount, years, and interest variables.

Option 1 calculates the expected return on a lottery ticket. Once you finish answering the questions about the lottery, you'll have a chance to print the screen. Be sure to change the default printer name for the screen print in line 90.

NUMBERS asks the easy questions first, including the name of the game, the price of a ticket, and how many games are on one ticket. Then comes the hard part. For each possible winning combination on the lottery ticket, copy from the lottery game brochure a name or label for that winning choice, such as "straight," or "Home Run," enter the odds of winning that amount, and the payoff odds for that win. If the lottery ticket doesn't cost a dollar, be sure to enter the payoff ODDS and not the payoff dollars. If you make a mistake entering the bet name or odds, enter 0 for the following prompt, and the cursor will return to the next prompt up. Leave any free ticket wins for last. After entering the last cash prize, press Enter at the "Bet name" prompt, and NUMBERS will ask if there is a free ticket prize. If there is, enter the odds, and NUMBERS will calculate its value.

Some free tickets also include a chance at an additional drawing. Those drawings typically divide less than ten prizes among however many tens of thousands of people qualified that week or month. The odds of winning those can't be calculated in advance without knowing how many people qualify, but usually, such a drawing may add as much as a penny to the expected return on a lottery ticket.

As each bet is entered, NUMBERS will calculate the expected return for that winning combination. After all the bets and any free ticket bets have been entered, NUMBERS will calculate the total expected return on that lottery game. For an instant game, the expectations are added up, because for any one game ticket, each of the possible winning combinations could apply to that ticket. For numbers games, the expectations are averaged, because only the bet placed when the ticket was bought, such as "boxed," can win on any particular ticket. NUMBERS is smart enough to figure out which situation applies, and will add or divide as needed.

For numbers games, the odds of winning a particular bet will not always be written out in the lottery brochure, but this calculation is super-easy. Just count how many possible numbers could let you win that bet. A straight bet can win only one way, so the odds are 1 in 1,000 in a three-digit numbers game or 1 in 10,000 in the four-digit game. A boxed bet, where a three-digit bet number can be scrambled in order, can win six ways (123, 231, 312, 132, 321, and 213), so those odds would be 6 in 1,000.

As you enter bets on numbers games, look out for multiple bets. I define that bet as one where the lottery appears to be paying far too much prize money, but has placed a minimum purchase on the bet. For example, the Maryland Pick 3 Numbers Game pays 500 to 1 on a single number with a "straight" bet, but on a three-way combination, with three possible winning numbers, such as 944, 499, and 949, the payout is also 500 to 1. But there is a minimum ticket purchase equivalent to three tickets, so this bet is really paying 500 to 1 on three individual "straight" bets. Other lotteries have similar multiple bets, and these bets look like better odds for the gambler, but they are equivalent to combinations of individual bets that have payoff expectations similar to all the other possible bets.

When you enter a multiple bet into NUMBERS, enter the odds of winning as the odds described by the lottery, but divided by the number of tickets in the purchase. In the Maryland example, enter the 500 to 1 odds as 166.7 to 1.

When Maryland first started its lottery game in the seventies, I knew the first million dollar winner, and, later on, two other acquaintances each won a million dollars. Two of the three won with the only ticket they bought that month. Statistically, I don't know enough people for three of them to be big winners, which just proves that statistics can only predict the overall winning patterns, and cannot say whether you will win or not. What? Do I play? Hmmm... Can't you guess?

NUMBERS

```
90 PR$="RS232.DA=8.BA=4800"
! Default printer name !200
100 ! NUMBERS !191
110 ! Lottery Numbers and In
stant Game Analysis--TIXB-J.
L.Stern 9/'91 V. 1.0 !012
120 CALL CLEAR :: CALL SCREE
N(13):: CALL TITLE2 !186
130 ON WARNING NEXT !215
140 CALL PAUSE !232
150 DISPLAY AT(1,5)ERASE ALL
:"Choose an Activity:":RPT$(
"_",28)!028
160 DISPLAY AT(5,1):"1 Analy
ze a Numbers game": :"2 Valu
e an annuity jackpot": :"3 H
elp getting started": :"4 Qu
it" !209
170 CALL KEYAT(13,1,S,"1A2V3
H4Q")!178
180 ON POS("1A2V3H4Q",CHR$(S
),1)GOTO 190,190,520,520,750
,750,680,680 !023
190 ! Analyze a lottery gam
 !229
200 EXPECT=0 :: WINNER=0 !14
0
210 DISPLAY AT(1,4)ERASE ALL
:"Analyze a Lottery Game":RP
T$("_",28)!041
220 DISPLAY AT(19,1):RPT$("_
",28)!241
230 DISPLAY AT(20,1):"What i
s the name of the     lotter
y game?" !049
240 CALL KEY(5,K,S):: ACCEPT
 AT(24,1):NM$ :: IF NM$="" T
HEN 150 !237
250 CALL HCHAR(1,1,32,32)::
DISPLAY AT(1,14-INT(LEN(NM$)
/2)):NM$ !055
260 DISPLAY AT(20,1):"How mu
ch does                one ti
cket cost?" !036
270 CALL HCHAR(24,1,32,32)::
 ACCEPT AT(24,1)VALIDATE(DIG
IT,".")SIZE(5):BET :: IF BET
=0 THEN 150 ELSE IF BET>10.
THEN 270 !074
280 DISPLAY AT(20,1):"How ma
ny sets of game        number
```

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EXTENDED BASIC—

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```
s are on one ticket?" !145
290 CALL HCHAR(24,1,32,32)::
 ACCEPT AT(24,1)VALIDATE(DIG
IT)SIZE(2):COUNT :: IF COUNT
=0 THEN 150 !120
300 DISPLAY AT(3,1):USING "G
ames on a $##.## ticket: ##"
:BET,COUNT :: BET=BET/COUNT
!233
310 N=0 :: ROW=6 :: DISPLAY
AT(5,1):"Bet Name     Payoff
  Returns" !244
320 DISPLAY AT(20,1):"Enter
the name, odds, and  payout
 for each type of bet (Boxed
, Match 5, etc.)" :: CALL PA
USE !148
330 DISPLAY AT(24,1):"   Pre
ss Enter when done." :: CALL
 KEY(5,K,S)!004
340 ROW=ROW+1 :: IF ROW>18 T
HEN 420 !120
350 DISPLAY AT(20,1):" Bet n
ame":"Odds 1 to ":"   Payou
t:" !186
360 ACCEPT AT(20,11)SIZE(12)
:BN$ :: IF BN$="" THEN 420 E
LSE BN$=SEG$(BN$&RPT$(" ",11
),1,12)!157
370 ACCEPT AT(21,11)VALIDATE
(DIGIT,"."):ODDS :: IF ODDS=
0 THEN 360 !178
380 ACCEPT AT(22,11)VALIDATE
(DIGIT,"."):PAID :: IF PAID=
0 THEN 370 !165
390 RET=BET*PAID/ODDS :: DIS
PLAY AT(ROW,1):USING "######
###### #####.# $##.###":BN$,
PAID,RET !187
400 N=N+1 :: EXPECT=EXPECT+R
ET :: WINNER=WINNER+1/ODDS !
034
410 GOTO 340 !164
420 DISPLAY AT(20,1):"Is the
re a free ticket      prize?
":" ":" ":" " !081
430 CALL KEYAT(21,8,S,"YN"):
: IF S=78 THEN 470 ELSE DISP
LAY AT(22,1):"What are the o
dds?" !062
440 ACCEPT AT(24,1)VALIDATE(
DIGIT,"."):ODDS :: RET=BET*E
XPECT/ODDS :: IF EXPECT>BET
THEN PAID=EXPECT/N ELSE PAID
=EXPECT !049
450 BN$="Free Ticket" :: DIS
PLAY AT(ROW,1):USING "######
######          $##.###":BN$,
RET !193
460 N=N+1 :: EXPECT=EXPECT+R
ET :: WINNER=WINNER+1/ODDS !
034
470 IF EXPECT>BET THEN EXPEC
T=EXPECT/N :: DISPLAY AT(18,
1):USING "Average Expected:
$#.#####":EXPECT :: GOTO 490
 !163
480 DISPLAY AT(18,1):USING "
 Total Expected: $#.#####":
EXPECT !244
490 DISPLAY AT(19,1):USING "
 Total Odds 1:#####.#####":
1/WINNER !174
500 GOSUB 710 :: CALL PAUSE
!130
510 GOTO 150 !229
520 ! Value an annuity jackp
ot !195
530 DISPLAY AT(1,3)ERASE ALL
:"Value an Annuity Jackpot":
RPT$("_",28)!008
540 DISPLAY AT(19,1):RPT$("_
",28):"How much is the jackp
ot?" !040
550 ACCEPT AT(24,1)VALIDATE(
DIGIT):P :: IF P=0 THEN 150
!083
560 DISPLAY AT(4,1):"$";P;"
Jackpot" !189
570 DISPLAY AT(20,1):"Paid o
ver how many years?" !141
580 ACCEPT AT(24,1):N :: IF
N=0 THEN 150 !251
590 P=P/N :: DISPLAY AT(5,1)
:"Paid in":N;"installments o
f $";INT(P*100)/100 !249600
DISPLAY AT(20,1):"How much i
s the current      interest r
ate on bonds?" !078
610 ACCEPT AT(24,1)VALIDATE(
DIGIT,"."):R :: IF R=0 THEN
150 ELSE IF R>1 THEN R=R/100
 !067
620 DISPLAY AT(8,1):"Interes
t rate is now";R*100;"%" !14
1
630 P=INT(P*100)/100 :: N=N-
1 :: CALL PRESENTVAL(P,R,N,P
V):: PV=PV+P !031
640 DISPLAY AT(10,1):"The va
lue of the annuity is":"$";
PV !124
650 GOSUB 710 !024
660 CALL PAUSE !232
670 GOTO 150 !229
680 ! Quit !070
690 DISPLAY AT(20,1)ERASE AL
L:"Remember...":"You have to
 play to lose!" !089
700 STOP !152
710 ! PRINT CHOICE SUBROUTIN
E !043
720 CALL HCHAR(20,1,32,98)::
 DISPLAY AT(24,1):"Print the
 screen? Y/N" !024
730 CALL KEYAT(24,23,S,"YN")
:: IF S=89 THEN DISPLAY AT(2
4,1):" " :: CALL DUMP(PR$)!0
95
740 RETURN !136
750 ! Help getting started !
085
760 DISPLAY AT(1,5)ERASE ALL
:"Help Getting Started":RPT$
("_",28)!152
770 DISPLAY AT(3,1):"   NUMB
ERS calculates the   expecte
d return on lottery  tickets
 in the Numbers gamesor Inst
ant (Rub-off) games." !074
780 DISPLAY AT(7,1):"A Numbe
rs game always uses a3 or 4
digit number to find the win
ner, and different   bets ar
e placed, including" !039
790 DISPLAY AT(11,1):"boxed,
 straight, etc.          If
the lottery game        includ
es a multiple-year      payoff
, calculate its true" !202
800 DISPLAY AT(15,1):"value
with option 2. NUMBERSis not
 intended to encouragegambli
ng, but to identify  lotter
ies as nothing more" !055
810 DISPLAY AT(19,1):"than s
tate funding sources. Rememb
er: Statistics predictmillio
ns of winning tickets,but no
7
1370 CALL HCHAR(ROW-1,COL,13
3)!151
```

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THE ART OF ASSEMBLY PART 4.

Memory Saving Tips

By Bruce Harrison

Back in the first installment of this series, we made the bold assertion that Memory is your Master. On the TI, that becomes apparent whenever one tries to do a really big job on this computer. Our Word Processor, which we use to prepare these articles, fills nearly all of the TI's memory capacity. On many occasions in writing and refining that program, we did "scrubdowns" on the source code, trying to find places where we could accomplish the same function with fewer bytes. That was necessary to add new features to the program. It's not unusual in a program that size (about 150 pages of source code) that one can find places to save several hundred bytes. After a couple of scrubdowns, this gets tougher.

In this article we'll pass along some of the lessons learned in that experience, and hope your Assembly programs will benefit. We'll start with one small concrete example.

Let's assume you have a variable called CURSCR, which is going to keep track of what screen in VDP RAM you're currently looking at. Since there are less than ten screens possible, you decide to make that variable a single byte:

```
CURSCR BYTE 0
```

That's fine until you discover that for many of its uses, you need to transfer that variable into a register to perform some action, and then need to transfer it back to the variable location. Look what that requires when we want the variable value in R4:

```
CLR     R4          Clear the register
MOVB    @CURSCR,R4  Move the byte in
SWPB    R4          Right justify the byte
(do some operation)
SWPB    R4          Move value to left byte R4
MOVB    R4,@CURSCR  Put byte back at CURSCR
```

That's okay if you only do it at one place in the program, but if it's required at many places, the one byte you saved by making the variable a byte will cost you dearly. If it were a word in memory as CURSCR DATA 0, then the above code would read:

```
MOV     @CURSCR,R4
(do some operation)
MOV     R4,@CURSCR
```

This takes six fewer bytes to perform than the previously shown code, because you skip the clear operation and you also skip the two SWPB operations. Yes, you could do the same thing as the first operation by:

```
MOVB    @CURSCR,R4
SRL     R4,8
(do some operation)
SWPB    R4
MOVB    R4,@CURSCR
```

But that still takes four more bytes than the operation would take by the second example above.

Let's look at another small example, from the Menu Driver we showed in Part 3 of this series. After the keystroke has been accepted, we did the following:

```
ACC1  MOV     R8,R5
      S       @NUMASK,R5
```

And so on until we branch to the address contained in R5. Actually, we needn't have moved the keystroke from R8 to R5, since we really made no other use of R8 in that section of code. Therefore we could eliminate the instruction MOV R8,R5 entirely, and just substitute R8 for R5 in the rest of that section of the source code.

That particular change will only save us two bytes of memory, but it would be part of a wider "scrubdown" effort, in which many bytes might be saved over the whole program.

MACROS

Just for a moment, we'll digress into the subject of Macros. The TI Assembler doesn't make any provision for them, but we don't use that Assembler. We prefer using Art Green's RAG Assembler, which does provide a capabilty to use Macros. A Macro is a sort of second cousin to a subroutine, but instead of being located at one place in memory and called from many other places, a Macro simply replicates a section of code wherever it's invoked. Our small subroutine MOVBTS, for example, could be implemented as a Macro. We would save some overhead that way, since the main program wouldn't need the BL @MOVBTS instruction, which in itself uses four bytes.

Nevertheless, we don't recommend using Macros on the TI, because that will become a bad habit, and larger sections of code will be replicated over and over again in your programs, eating up valuable memory space. On the PC computer, we have resorted to using some very small Macros, to perform such functions as setting segment registers. Excessive use of Macros instead of subroutines is another reason that PC programs become overly large.

You may well ask why, then, do we use (and recommend) Art

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```
1380 CALL HCHAR(ROW-1,COL+1,
134)!083
1390 IF NOTE<>2 THEN 1420 !0
62
1400 CALL HCHAR(ROW+1,COL,38
)!105
1410 CALL HCHAR(ROW+1,COL+1,
39)!037
1420 RETURN !136
1430 CALL CLEAR !209
1440 END !139
```

ART OF ASSEMBLY—

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Green's RAG Assembler. That's simple. The RAG Assembler provides the best error reporting scheme of any Assembler we've seen. If, for example, you have an undefined symbol in your code, it tells you on-screen at which line of which file the erroneous label occurs, and shows you that line of source code. This makes it much easier to track down and correct source code errors.

SAVING BYTES IN PROGRAMS

Let's get off our soapbox now and get back to some serious business. There are many ways to save bytes in programs. We often find that savings can be made simply by changing the way we perform an operation. Here's an example from one of the subroutines in Part 2 of this series. Let's look at our screen clearing subroutine:

```
CLS     LI    R2,SCRWID   Sets R2 to characters in screen line
        LI    R5,>2000    Sets left byte R5 to space
        LI    R3,SCRLI    Point R3 at SCRLI
        MOV   R3,R1       Point R1 at SCRLI also
LOOP1   MOVB  R5,*R3+     Move one byte and increment R3
        DEC   R2          Decrement R2
        JNE   LOOP1       If not zero, repeat
        CLR   R0          Point R0 to screen origin
        LI    R2,SCRWID   Set R2 again
        LI    R4,24       24 rows to clear
LOOP2   BLWP  @VMBW       Write SCRWID bytes to screen
        A     R2,R0       add that many bytes to R0
        DEC   R4          Decrement R4
        JNE   LOOP2       If not zero, repeat
        RT                Return to calling program
```

The part at LOOP2 will serve as an example. We could have written that as:

```
LOOP2   BLWP  @VMBW       Write SCRWID bytes to screen
        AI    R0,SCRWID   add SCRWID bytes to R0
        DEC   R4          Decrement R4
        JNE   LOOP2       If not zero, repeat
        RT                Return to calling program
```

That would work every bit as well, but since R2 already contains SCRWID while we're executing this loop, using the instruction A R2,R0 saves us two bytes. Similarly, in the section before LOOP1, we anticipated needing R1 pointed to SCRLI, so we moved R3 to R1, rather than having to LI R1,SCRLI. That also saves two bytes.

Moving or adding values from register to register rather than from immediate values should be the practice whenever possible. Such moves not only save memory, but also execute faster.

Another practice we encourage is maximizing use of the integer math operations. In our Menu Driver, for example, we wanted to double a number in the range of 0 through 7. We could have accomplished that this way:

```
        LI    R3,2        Place 2 in R3
        MPY   R3,R5       Multiply by the value in R3
        MOV   R6,R5       Put result back into R5
```

What we actually did was simply to SLA R5,1. This saves bytes and execution time. Whenever the range of possible outcomes is 0 through 32767 or less, doubling can be done in this manner. (Negative numbers can also be doubled this way.) There will of course be instances when the MPY instruction must be used, because the result will be too large to fit in one register, but every time one can use the shortcut SLA instruction, memory and time will both be saved.

Similarly, one can divide by two with a simple SRL or SRA instruction. In general, any time one needs to multiply or divide by an integral power of two (2, 4, 8, etc.), one should look and see whether the expected range of the outcome will permit shifting the number rather than using MPY or DIV to perform the operation.

EXCEPTIONS

There are of course exceptions to any rule. In our music programs, we perform timing of note durations using a loop. One of our customers disassembled our code, and told us that one operation in that loop could have been performed by a simple compare operation instead of the DIV that we used. He was correct, except that we used DIV on purpose to kill time in that loop. A compare operation would take far less time to execute, but then we'd have had to find some other way to waste time in the loop, otherwise our whole scheme for timing durations would need revision.

We said in our last installment that this one would include some right and wrong examples. Here's one. Let's suppose that you have a menu on the screen, and you wish to branch out to one of six labels (FUNCT1 through FUNCT6) from that menu. Assume for the moment that the key value in question is in R8. Here's the wrong way to do that branching:

```
        AI    R8,->31     Remove number mask plus 1
        JLT   OUTRNG      If lower than 0, key is out of range
        JGT   CMP1        If greater than 0, jump ahead
        B     @FUNCT1     Else function 1 chosen
CMP1    CI    R8,1        Has #2 been chosen?
        JGT   CMP2        If greater, jump ahead
        B     @FUNCT2     Else GOTO function 2
CMP2    CI    R8,2        Has #3 been chosen?
        JGT   CMP3        If greater, jump ahead
        B     @FUNCT3     Else GOTO function 3
CMP3    CI    R8,3        Has #4 been chosen?
        JGT   CMP4        If greater, jump ahead
        B     @FUNCT4     Else GOTO function 4
CMP4    CI    R8,4        Has #5 been chosen?
        JGT   CMP5        If greater, jump ahead
        B     @FUNCT5     Else GOTO function 5
CMP5    CI    R8,5        Function 6?
        JGT   OUTRNG      If greater, key is out of range
        B     @FUNCT6     Else perform function 6
OUTRNG (IGNORE THE KEYSTROKE)
```

Now here's the right way to do it. Start by putting a lookup table in the data section like this:

```
LUT   DATA  FUNCT1,FUNCT2,FUNCT3 ... ,FUNCT6
```

Now the branching can be done like this:

```
        AI    R8,->31     Remove number mask plus 1
        JLT   OUTRNG      If result less than zero, jump
```

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```
        CI    R8,5          Is number greater than 5?
        JGT   OUTRNG        If so, jump
        SLA   R8,1          Else double the number
        MOV   @LUT(R8),R5   Put selected address in R5
        B     *R5           Branch to the address in R5
OUTRNG (IGNORE THE KEYSTROKE)
```

This takes many fewer bytes than the code shown above as the wrong way. We'll leave calculation of how many bytes fewer as an exercise for the student. On a casual first look, the twelve bytes used by the lookup table might seem wasteful, but overall we have a significant saving by "spending" those twelve bytes. This is similar to an Extended BASIC situation in which a chain of IF THEN statements is replaced by an ON GOTO. That saves both bytes and execution time in XB, just as this "right" way does in Assembly.

This method will work very nicely when there's only one menu in your program. See the source code given in Part 3 for an efficient way to handle more than one menu.

SAVING MEMORY THROUGH RECYCLING

One more method of memory saving we should mention, and that's what we'll call recycling. (Recycling is a fashionable term nowadays.) A small example or two should give you the idea. In our Golf Score Analyzer, we have a part of the data section of our code devoted to the copyright notice. It looks like this:

```
CPYRT   BYTE 14       length of first line
        TEXT 'Copyright 1991'
        BYTE 17       length of second line
        TEXT 'Harrison Software'
```

Altogether that takes up 33 bytes. It's used only once, at the very beginning of the program, then becomes wasted memory space. At later stages of the program, we needed an area of 56 bytes length to store a temporary record of a round of golf. Ordinarily one would give that a label and a BSS like:

```
TEMREC  BSS 56
```

But by placing that label just before the copyright notice, we could make it:

```
TEMREC  BSS 23
```

Thus the rest of the 56 bytes in TEMREC overwrites the copyright notice, which we don't need anymore.

In a pinch, we could also use some of the area filled by the code that places that copyright notice on the screen as data storage. We didn't do that in this instance, but we did recycle the area in memory where the Extended BASIC LOAD program is loaded to store user data about courses played. Thus when our program ends, the original Extended BASIC program which got our Assembly program going has been destroyed. (When exiting our program, we take steps to insure that Extended BASIC will "know" that it has no program in memory.)

PROGRAM OVERLAYS

One final option for dealing with the shortage of memory is the use of program overlays, where a new section of program is brought in from disk and written over an existing section of code or data. We resorted to that method for some utility features in our Word Processor, but we'll save that rather complex topic for a later article in this series.

We hope these few examples will serve to inspire you in finding ways to save memory in your own programs.

In the next article, I plan to include more subroutines that will be directly usable in your programs.

Lima UG distributes Funnelweb V4.4 disks

The Lima 99/4A Users Group is mak-ing available Funnelweb V4.4 to any individual or users group.

According to the group's newsletter, per-sons wishing to receive a copy of the new version of the word-processing program by Tony McGovern of Australia may do so by sending two DSDD disks (everything unarchived), two DSSD disks (files partially archived) or four SSSD disks (files partial-ly archived) and a paid return mailer to P.O. Box 647, Venedocia, OH 45894.

Boston Fair set April 4

The 1992 Northeast Computer Fair will be held April 4, hosted by the TI99/4A User Group of the Boston Computer Society.

Justin Dowling, director of the TI99/4A User Group of the Boston Computer Society, says the date was chosen so as not to conflict with Passover or Easter holidays.

Fair coordinator is Ron Williams, 14 East St., Avon MA 02332.

BASIC Assembly

Some RAW disk repairs

By BARRY TRAVER

I had intended this month to give you an authoritative list of the DSRLNK, GPLLNK, and XMLLNK routines that work with TI Extended BASIC, but I have been finding that the information is not easy to gather. While it's fairly easy to come up with a list of GPLLNK and XMLLNK routines that will work with EA3 and EA5 programs (and not much more difficult to come up with a list of DSRLNK routines that will work with EA3 and EA5), it appears that no such list has been made up for the XB environment. (At least I haven't come up with one yet; if you know of one, let me know!)

Some of the routines work with XB, and some don't. I'm checking them out, one by one, but it takes time, so we'll have to postpone that subject a month or so. Instead, I thought you might like to take a look at some practical applications of the "RAW" (single-sector disk access or "Read And Write") CALL LINKs provided in the previous column.

Have you ever tried to read some important files on a disk and then found that somehow the disk had apparently gotten damaged? Perhaps your disk controller tells you that the disk is not initialized. Or, when you catalog the disk, you find the files are not in alphabetical order, or maybe the same filename appears more than once. Or maybe you try to load in a TI-Writer file, and your disk drive makes a valiant effort ... until it apparently reaches a bad sector and cannot read any further. If none of these things has happened to you, count yourself indeed fortunate!

This month's column has a dual purpose: (1) to teach you something about the main "housekeeping" sectors on a disk (sectors 0 and 1) and (2) to teach you how to make some minor repairs if you do run into such problems. In order to run the programs provided, you will first have to load "RAW" (from the previous column) into memory. (If you happen to have a copy of my XXB, just run XXB first, and that will also serve the purpose.)

Sectors 0 and 1 are not only the most important "housekeeping" sectors on the disk, but also the most likely sectors to become damaged, since they are on the outer edge of the disk. The program DISKTUTOR will teach you about how these important sectors are set up. (Homework assignment: why not see how well you have understood everything so far, and embed the RAW routines in the XB program? That will save you the trouble of having to load in RAW separately each time before you run DISKTUTOR.)

We'll briefly cover three situations: (1) a bad sector 0, (2) a bad sector 1, and (3) bad sectors in text files. All of these are usually relatively easy to fix.

DISKTUTOR is essentially self-explanatory. I will add two additional comments, however: First, byte 16 of sector 0 is the place where TI used to put the protection sign to keep a disk from being copied by the TI Disk Manager. If byte 0 is "P," the disk is "Protected," whereas if it is " " (a blank space, ASCII 32), then it has no such protection. (Most disk manager programs today entirely ignore this byte.) Second, if you have a Myarc 512K memory card, you will now understand why 400K (or 1600 sectors) is the largest size RAMdisk you can have: there are only 1600 bits available in the bit allocation map in sector 0. (You'll also "learn" that your Myarc RAMdisk has 40 tracks and 16 sectors per track, whatever that means to a RAMdisk!)

Let's move on to the matter of simple disk repairs. We'll briefly cover three situations: (1) a bad sector 0, (2) a bad sector 1, and (3) bad sectors in text files. All of these are usually relatively easy to fix.

IMPORTANT first thing to keep in mind: do NOT mess around with the disk that is damaged! Put a write protect sticker on it, and use KLUDGECOPY to copy the disk onto a blank initialized disk of the same type. (Like DISKTUTOR, KLUDGECOPY also requires that RAW be loaded into memory first.) KLUDGECOPY is definitely not fast, but it is the necessary first step to what follows, and KLUDGECOPY will make some minor repairs for you, as well as tell you if you have sectors that cannot physically be read by your drive. (There are two types of bad sectors: blown sectors that have had the data changed but still can be accessed, and damaged sectors that cannot be accessed unless the disk is reinitialized, which is something you do not want to do at this point!)

Put your bad disk in drive one, put the new blank disk in drive two, and run KLUDGECOPY, after you have changed line 150 to reflect the last sector on your disk (1439 for DS/DD, 719 for DS/SD or SS/DD, and 359 for SS/SD — remember that the first sector is called sector 0). After you have made your copy, put your bad disk away in a "safe" place until you see whether your attempt to make repairs on the copy is successful.

Now try to determine what the problem is. If your disk controller thought that your original bad disk was uninitialized, it may be that you have a bad sector zero. There's another possiblity, however, if you happen to be using a Myarc HFDC (Hard/Floppy Disk Controller): be aware that the HFDC is unable to read single-density disks that have been formatted using the CorComp disk controller. The only solution to that particular problem is to format a blank single-density disk with a TI or Myarc disk controller, and then use a TI, CorComp, or standard Myarc floppy disk controller (not the HFDC!) to file-

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copy all the files over to the newly formatted disk. (I know, if you have lots of single-density disks formatted by the CorComp controller, that's not a happy prospect to consider, but that's the price of progress!)

Let's consider another situation: if the filenames seem messed up when you catalog the disk, (some files are missing, out of alphabetical order, or duplicated), then the problem is likely to be that you have a bad sector one. (By the way, if you accidentally deleted a file without desiring to do so and if you have not yet written to the disk since you made that mistake, remember that you can use the "Restore File" option on DM1000 to bring back the file. I believe in making use of whatever solution available is easiest!)

The third situation is simplest of all (thanks to KLUDGECOPY). You may be unable to load a text file into the TI-Writer editor because there appear to be some bad sectors in the file. (By bad I mean damaged rather than blown. It is also possible for blown sectors to cause a problem — a TI-Writer file may "lock up" your computer when the file is loading in because of a blown sector with some unhelpful control characters in it — but that's a topic for another time. Maybe I'll say more about that next month.)

Let's take up the situations, one by one:

(1) BAD SECTOR ZERO. Load RAW into memory. Put the copy of your bad disk in drive one, and put a new good blank disk of the same size in drive two. If sector 0 on your bad disk was blown rather than damaged, you'll need to copy a new sector 0 onto the copy disk. To do so, enter the following commands in immediate mode in XB:

CALL LINK("READ",2,0,A$,B$)
CALL LINK("WRITE",1,0,A$,B$)

If sector 0 on your original bad disk was damaged (indicated by KLUDGECOPY telling you that sector 0 was a "bad sector") rather than blown, this step is not necessary, but it won't hurt if you do it anyway.

If that was your only problem, then (except for the bit allocation map being messed up) your disk is now (if you're lucky) essentially repaired. However, if you were to write anything to your disk, you would write right over the files already there, because the sectors are not marked off as "used" in the bit map. There is, however, a very simple way to fix the bit map in sector zero: do a file copy (NOT a disk copy!) of the entire disk in drive one to the new blank disk in drive two, using any standard disk manager program, and then reinitalize the disk in drive one. (I know, you could redo the bit allocation map yourself, but why not let the computer do the hard work for you?)

(2) BAD SECTOR ONE. The DISKTUTOR program can show you if the pointers to the file headers are messed up in sector one on the copy of your bad disk. If they are, I suggest that you get brave and attempt to do some experimentation on sector one with a disk sector editor of your choice (DSKU, DPATCH, etc.). What you need to do is determine where the file headers are on the disk, and then arrange the pointers in alphabetical order according to filename.

If things are not in alphabetical order, some programs (not all) will not be able to find some of the files, since some programs do a "binary search" which assumes that everything is indeed sorted in alphabetical order. If you do find a disk manager program that can find the files anyway even if they do not catalog in alphabetical order (I think I have come across such a program, though I may have dreamed it!), a solution to your problem could be simply to use such a program to do a file copy of all the files to a new disk. Sector one on the new disk should then be okay.)

(3) BAD SECTORS IN TEXT FILE. If it's a problem with damaged sectors, this is the easiest problem to fix. In fact, KLUDGECOPY has already done it for you! If you load the file into TI-Writer (hopefully it will load now, unless the problem was something else, like embedded control characters in a blown sector rather than a damaged sector), you see a section of 24 lines indicating where the "*MISSING" material is or was. I know, the missing material is lost forever and you will have to write it afresh, but that's better than having to rewrite the whole file, right?

Well, this is a once-over-lightly treatment of the subject of disk repairs. These techniques won't solve all of the problem. (if there is interest, I may tell you in a future column how to handle more difficult situations, such as how to retrieve as much as possible of an XB program that has managed to pick up a bad sector or two), but I hope that the discussion and the programs been helpful to you (and since you didn't mess with your original bad disk, it certainly couldn't cause you any harm!).

Well, RAW has many other applications, and there are many other useful built-in DSRLNK, GPLLNK, or XMLLNK assembly routines available to us that we can access from XB by CALL LINKs. These subjects are likely topics for next time's column, but you've got something to keep you busy for another month. Until next time, then, keep on compuTIn'!

KLUDGECOPY

```
100 ! KLUDGECOPY by Barry Tr
aver, 835 Green Valley Drive
, Philadelphia, PA 19128 (ph
one:  215/483-1379) - Use th
is program with care! !174
110 T1$=RPT$(CHR$(8)&"*MISS
NG",14)&CHR$(8)&"*" :: T2$="
MISSING"&RPT$(CHR$(8)&"*MISS
ING",9)&CHR$(255)&RPT$(CHR$(
0),39)!117
120 Z$=RPT$(CHR$(0),128):: D
IM A(100):: CALL CLEAR :: PR
INT "KLUDGECOPY by Barry Tra
ver": :"Use this program wit
h care!": :!120
130 INPUT "Put master disk i
n drive 1, blank disk in dri
ve 2, and  press enter.  ":R
$ :: PRINT :: CALL KEY(3,K,S
)!148
140 INPUT "Are you sure that
 you have ablank disk in dri
ve 2 (Y/N)?":R$ :: IF R$<>"Y
" THEN STOP ELSE C=0 :: PRIN
T :"SECTORS COPIED:" !088
150 FOR N=0 TO 1439 :: ON ER
ROR 170 :: CALL LINK("READ",
1,N,A$,B$):: ON ERROR STOP :
: PRINT N;:: CALL LINK("WRIT
E",2,N,A$,B$)!151
160 NEXT N :: PRINT :"BAD SE
CTORS:  " :: FOR I=1 TO C ::
 PRINT A(I);:: NEXT I :: PRI
```

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```
NT :: STOP !117
170 IF N=1 THEN CALL LINK("W
RITE",2,N,Z$,Z$)ELSE IF N>1
THEN CALL LINK("WRITE",2,N,T
1$,T2$)!038
180 C=C+1 :: A(C)=N :: RETUR
N 160 !241
```

DISKTUTOR

```
100 ! DISKTUTOR BY BARRY TRA
VER, 835 GREEN VALLEY DRIVE,
 PHILADELPHIA, PA 19128 (PHO
NE: 215/483-1379) !030
110 CALL CLEAR :: CALL SCREE
N(5):: FOR I=0 TO 12 :: CALL
 COLOR(I,16,1):: NEXT I :: D
IM C$(255),H$(255)!034
120 DISPLAY AT(1,11):"DISKTU
TOR":TAB(11);"=========": :T
AB(6);"COPYRIGHT (C) 1991":T
AB(8);"by Barry Traver" !017
130 DISPLAY AT(7,6):"Ever wo
nder what's on":"those two s
ectors that are":"already ma
rked off as ""used""":"when
you initialize a disk?" !130
140 DISPLAY AT(11,1):"Well,
this tutorial will let":"you
 see how the TI DOS (Disk":"
Operating System) uses the"
!222
150 DISPLAY AT(14,1):"first
two sectors to do its""":"ho
usekeeping"" chores.": :TAB(
6);"The actual files (and" !
023
160 DISPLAY AT(18,1):"one-se
ctor file headers) are":"kep
t elsewhere on the disk,":"b
ut the essential general":"i
nformation is kept on the" !
200
170 DISPLAY AT(22,1):"first
two sectors, 0 and 1." :: CA
LL PAUSE(1)!085
180 DISPLAY AT(3,6):"The bes
t way to see how":"things ar
e set up is to look":"at spe
cific examples.  That":"is w
hat we will do here, so" !12
8
190 DISPLAY AT(7,1):"at this
 point you need to":"choose
a sample disk that":"you wou
ld like to explore,":"and pl
ace it in one of your" !195
200 DISPLAY AT(11,1):"drives
 (or you may want to":"see w
hether this program":"will w
ork on your ramdisk).": :TAB
(6);"What drive would you" !
052
210 DISPLAY AT(16,1):"like t
o examine (1-9)?" :: ACCEPT
AT(16,25)SIZE(1)VALIDATE("12
3456789")BEEP:D !078
220 DISPLAY AT(18,6):"Place
your disk in the":"appropria
te drive, and press":"enter.
" :: I=0 :: GOSUB 700 !146
230 CALL TOPLINE :: DISPLAY
AT(4,6):"Each sector (includ
ing":"sector 0) is made up o
f 256 bytes, numbered from 0
 to   255." !208
240 DISPLAY AT(9,6):"Sector
0 is called the":"Volume Inf
ormation Block or VIB (not t
o be confused withVIP, which
 is _you_)." !141
250 DISPLAY AT(14,6):"On thi
s sector, most":"of the gene
ral information  concerning
the disk is to befound (exce
pt for sector 1," !134
260 DISPLAY AT(18,1):"the fi
le descriptor index,  which
tells where headers   for th
e various files are   found)
." :: CALL PAUSE(1)!168
270 DISPLAY AT(4,6):"Bytes 0
 through 9 tell":"the disk n
ame:" :: CALL ANALYZE0(C$(),
0,9,7):: M$=SEG$(A$,1,10)!22
5
280 IF SEG$(M$,LEN(M$),1)="
" THEN M$=SEG$(M$,1,LEN(M$)-
1):: GOTO 280 !065
290 DISPLAY AT(20,1):"The na
me of the disk you putin dri
ve";D;"is ";M$;"." :: CALL P
AUSE(1)!148
300 DISPLAY AT(3,6):"Bytes
10  and 11 tell":"us the tot
al number of for- matted sec
tors (including  sectors 0
and 1)." !166
310 CALL ANALYZE0(C$(),10,11
,8):: DISPLAY AT(13,6):"The
following chart may":"help o
ut:" !226
320 DISPLAY AT(16,6):">0168
=  360 sectors":TAB(6);">02D
0 =  720 sectors":TAB(6);">0
5A0 = 1440 sectors":TAB(6);"
>0B40 = 2880 sectors" !076
330 T=256*ASC(C$(10))+ASC(C$
(11)):: DISPLAY AT(21,6):"Th
erefore your disk has":STR$(
T);" total sectors." :: CALL
 PAUSE(1)!125
340 DISPLAY AT(3,6):"Byte 12
 of sector 0":"tells us the
number of sec- tors per trac
k:" :: CALL ANALYZE0(C$(),12
,12,7)!071
350 DISPLAY AT(11,1):"Your d
isk has";ASC(C$(12));"sector
s per":"track.": :TAB(6);"By
tes 13-15 use ""DSK""" !029
360 DISPLAY AT(15,1):"to ind
icate that the disk  has be
en initialized." :: CALL ANA
LYZE0(C$(),13,15,18):: CALL
PAUSE(1)!243
370 DISPLAY AT(3,6):"We'll g
o by byte 16 to":"byte 17, w
hich tells us the number of
tracks per side:" :: CALL AN
ALYZE0(C$(),17,17,7)!224
380 DISPLAY AT(11,1):"You ha
ve";ASC(C$(17));"tracks/side
.": :TAB(6);"Bytes 18 and 19
 tell":"us the number of sid
es and the density:" !224
390 CALL ANALYZE0(C$(),18,19
,17):: IF ASC(C$(18))=1 THEN
 S$="SS/";ELSE S$="DS/" !048
400 IF ASC(C$(19))=1 THEN D$
="SD." ELSE D$="DD." !025
410 DISPLAY AT(22,1):"Thus y
our disk is ";S$;D$ :: CALL
PAUSE(1)!250
420 DISPLAY AT(3,6):"Since b
ytes 20 through":"55 are not
 currently used,":"all that
remains to be con-" !016
430 DISPLAY AT(6,1):"sidered
 is the allocation":"bit map
 in bytes 56 to 255.": :TAB(
6);"The bits in these bytes"
 !123
440 DISPLAY AT(10,1):"tell w
```

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We put together a collection of the best programs that catalog and load a group of programs on a disk. Just try them, pick the one you like and transfer it to another disk with the file name LOAD and you are in business.

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Two great programs for making custom labels for disks, addresses video tapes or any other application. Even contains a graphic display of the TI-99/4A console. Now you can create custom labels of any number by just typing in the lines as you want them. Uses standard tractor labels.

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With this disk you print out the data you have stored with the TI HBM Module. HBM is a great module that can be used for many home and small business applications but TI forgot to include a printout function. This program comes with full instructions and we are sure that your HBM Module will now start being used. Fantastic programming job.

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This disk has everything you need to learn and practice Morse Code for the various FCC license exams. It also is great for scout groups and school "ham" clubs for group training and merit badge qualification. Professional quality.

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#93. THE 1991 KBGB GIRLIE CALENDAR
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Two bible games)non-fiction) that work with the TI Adventure Module.

#99. GREAT 99/4A GAMES VOL. IV
This disk features the works of J. Peter Hoddie. All of these games are of commercial qualaity and well worth the donation requested!

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An exciting game for use with the Tunnels of Doom module. Several Exbasic bonus games are included.

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This screen enhancement utility lets you do 40 columns, windowing, reverse scrolling, clock/alarm, and a whole host of other great tricks in exbasic. Fully documented.

#102. COLOSSAL CAVES ADVENTURE
This classic adventure now available for the 99/4A is what led to the Zork series. Hours of text adventuring.

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This program which is currently selling for big bucks on module turns your 99/4A into an electronic organ. Sound effects, different instruments and voices, chord forms, color graphics with complete control of all.

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This two-sided (flippy) disk gets you into C programming with your 99/4A. Comes with a great collection of utilities such as text & graphics. (E/A)

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This powerful utility written in Forth allows disassembly of programs off disk in any format, in memory, and even off of P-Box cards. Very complete with some very unique features.

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One of the most popular and recommended of the 99/4A terminal emulator programs. Supports TE-II, ASCII, and X-Modem transfers, print spooling and more. Loads from Exbasic or E/A.

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A utility for converting DIS/FIX 80 assembly object code files to PROGRAM image. This allows files to load faster and take up less space on disk. Full Doc

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The original BITMAC is now available at $4.95 with all original documentation. A powerful graphics program for the 4A which lets you print where you want..even over pre-existing text. Create great graphics in 16 colors, print text sideways, mirror image, upside down etc. etc. A **must** for anyone into 99/4A graphics. Comes with second bonus disk with utilities such as sign & banner makers. Even can computer generate your own signature!

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BASIC/ASSEMBLY—

(Continued from Page 19)

```
hether or not a sector":"is
regarded as in use.  If a":"
certain sector doesn't exist
" !241
450 DISPLAY AT(13,1):"(e.g.,
 sector 360 or 361 on":"a SS
/SD disk), it is also":"mark
ed off as used.": :TAB(6);"S
ince there are only" !142
460 DISPLAY AT(18,1):"1600 s
uch bits available (0":"thou
gh 1599), there aren't":"eno
ugh bits for each sector":"o
n a 2880-sector disk to get"
 !176
470 DISPLAY AT(22,1):"its ow
n bit." :: CALL PAUSE(1)!132
480 DISPLAY AT(3,6):"""Quad"
"-density format":"(80-track
 DS/DD) is beyond  the scope
 of this tutorial. For sake
of illustration," !118
490 DISPLAY AT(7,1):"the fol
lowing assumes you":"have no
rmal 40-track drives." !151
500 DISPLAY AT(10,6):"Choose
 a byte from 56":"to 255, an
d we'll analyze itbit-by-bit
: ";!017
510 ACCEPT AT(12,14)SIZE(3)V
ALIDATE("0123456789")BEEP:B
:: IF B<56 OR B>255 THEN 510
 ELSE DISPLAY AT(10,1):"":""
:"" !053
520 CALL ANALYZE0(C$(),B,B,1
0):: N$=STR$(ASC(C$(B))):: C
ALL C102(N$,N$)!216
530 IF LEN(N$)<>8 THEN N$="0
"&N$ :: GOTO 530 !159
540 DISPLAY AT(14,13):"BITS"
 :: B$="    " :: FOR J=1 TO L
EN(N$):: B$=B$&SEG$(N$,J,1)&
"  " :: NEXT J :: DISPLAY AT
(15,1):B$ !199
550 S=8*(B-56):: C=6 :: FOR
J=S+7 TO S STEP -2 :: DISPLA
Y AT(17,(C-LEN(STR$(J)))):ST
R$(J);:: C=C+6 :: NEXT J !04
1
560 C=9 :: FOR J=S+6 TO S ST
EP -2 :: DISPLAY AT(18,(C-LE
N(STR$(J)))):STR$(J);:: C=C+
6 :: NEXT J :: DISPLAY AT(19
,11):"SECTORS" !105
570 DISPLAY AT(21,6):"If the
 bit is 1, the":"sector is u
sed; if it is 0, the sector
is unused.  Like to do anoth
er? (Y/N)" !188
580 ACCEPT AT(24,22)SIZE(1)V
ALIDATE("YN")BEEP:R$ :: IF R
$="Y" THEN CALL HCHAR(10,1,3
2,480):: GOTO 500 !058
590 CALL TOPLINE :: DISPLAY
AT(3,6):"Actually, bytes 236
 to":"255 on sector 0 don't
really":"tell you anything f
or normal" !230
600 DISPLAY AT(6,1):"40-TRAC
K disks, because no":"such d
isk has more than 1440":"sec
tors.  (""Quad"" density":"d
isks can have 2880 sectors,"
 !201
610 DISPLAY AT(10,1):"but ea
ch bit in the alloca-":"tion
 bit map for such a disk":"r
epresents not one sector,":"
but two sectors!)" !190
620 DISPLAY AT(15,6):"Having
 explored sector":"0 on your
 disk, we are ready":"to mov
e on to sector 1.  If":"you
are ready to do so, then" !0
27
630 DISPLAY AT(19,1):"please
 press enter to indi-":"cate
 that." :: I=1 :: GOSUB 700
!165
640 CALL TOPLINE :: DISPLAY
AT(4,6):"Each sector (includ
ing":"sector 1) is made up o
f 256 bytes or 128 words, nu
mberedfrom 0 to 127." !132
650 DISPLAY AT(9,6):"Sector
1 is called the":"File Descr
iptor Index Recordor the Dir
ectory Link Map." !033
660 DISPLAY AT(13,6):"On sec
tor 1 are found":"the pointe
rs to the various file descr
iptor records or  file ""hea
ders.""" !103
670 DISPLAY AT(18,6):"The po
inters are listed":"not in n
umerical order, but rather i
n alphabetical orderaccordin
g to the filenames." !214
680 CALL PAUSE(1):: CALL AN...
LYZE1(C$(),H$(),D,E$):: CALL
 PAUSE(0):: DISPLAY AT(12,5)
BEEP ERASE ALL:"Another disk
 (Y/N)?" !012
690 ACCEPT AT(12,26)VALIDATE
("YN")SIZE(1)BEEP:R$ :: CALL
 CLEAR :: IF R$="Y" THEN CAL
L TOPLINE :: GOTO 180 ELSE S
TOP !220
700 CALL KEY(3,K,S):: IF K<>
13 THEN 700 !243
710 DISPLAY AT(22,10):"Readi
ng...." :: CALL LINK("READ",
D,I,A$,B$):: DISPLAY AT(24,8
):"Calculating...." !164
720 FOR I=0 TO 127 :: C$(I)=
SEG$(A$,I+1,1):: C$(I+128)=S
EG$(B$,I+1,1):: NEXT I :: R=
0 :: F=1 :: RETURN !022
730 SUB C1610(I$,O$):: D=0 :
: L=LEN(I$):: FOR I=1 TO L :
: D=D+(POS("0123456789ABCDEF
",SEG$(I$,I,1),1)-1)*16^(L-I
):: NEXT I :: O$="" !193
740 Q=INT(D/10):: O$=SEG$("
123456789",D-10*Q+1,1)&O$ :.
 IF Q<>0 THEN D=Q :: GOTO 74
0 !104
750 SUBEND !168
760 SUB C1016(I$,O$):: D=0 :
: L=LEN(I$):: FOR I=1 TO L :
: D=D+(POS("0123456789",SEG$
(I$,I,1),1)-1)*10^(L-I):: NE
XT I :: O$="" !032
770 Q=INT(D/16):: O$=SEG$("0
123456789ABCDEF",D-16*Q+1,1)
&O$ :: IF Q<>0 THEN D=Q :: G
OTO 770 ELSE IF LEN(O$)<2 TH
EN O$="0"&O$ !166
780 SUBEND !168
790 SUB C102(I$,O$):: D=0 ::
 L=LEN(I$):: FOR I=1 TO L ::
 D=D+(POS("0123456789",SEG$(
I$,I,1),1)-1)*10^(L-I):: NEX
T I :: O$="" !234
800 Q=INT(D/2):: O$=SEG$("01
",D-2*Q+1,1)&O$ :: IF Q<>0 T
HEN D=Q :: GOTO 800 !145
810 SUBEND !168
820 SUB ANALYZE0(C$(),J,K,R)
:: DISPLAY AT(R,4):"BYTE
 CHR$    ASCII": : :: R=R+2
:: FOR I=J TO K :: E$=STR$(I
```

(See Page 25)

BASIC/ASSEMBLY—

(Continued from Page 24)

```
):: CALL C1016(E$,F$)!082
830 B$=E$&" OR >"&F$ :: DISP
LAY AT(R,11-LEN(B$)):B$ :: R
$=C$(I):: DISPLAY AT(R,15):R
$;:: K$=STR$(ASC(R$)):: CALL
 C1016(K$,L$)!157
840 A$=K$&" OR >"&L$ :: DISP
LAY AT(R,28-LEN(A$)):A$ :: R
=R+1 :: NEXT I !154
850 SUBEND !168
860 SUB TOPLINE :: DISPLAY A
T(1,1)ERASE ALL:"DISKTUTOR b
y Barry Traver" :: SUBEND !1
97
870 SUB PAUSE(C):: DISPLAY A
T(24,1):"(Press any key to c
ontinue.)" !119
880 CALL KEY(3,K,S):: IF S<1
 THEN 880 ELSE IF C THEN CAL
L TOPLINE !059
890 SUBEND !168
900 SUB ANALYZE1(C$(),H$(),D
,E$):: DISPLAY AT(3,8):"HEAD
ER":"WORD  LOCATION     FILE
NAME" :: I=0 :: R=6 !082
910 E$=STR$(I/2):: J=LEN(E$)
:: CALL C1016(E$,F$):: F$=">
"&F$ :: K$=STR$(ASC(C$(I))):
: P$=STR$(ASC(C$(I+1)))!226
920 CALL C1016(K$,L$):: CALL
 C1016(P$,M$):: N$=L$&M$ ::
CALL C1610(N$,N$):: H$(I/2)=
N$ !073
930 DISPLAY AT(R,4-J):E$;::
DISPLAY AT(R,(6-LEN(K$))):">
";L$;M$;TAB(11);"OR ";N$;!17
0
940 S=VAL(N$):: IF S<>0 THEN
 CALL LINK("READ",D,S,A$,B$)
:: DISPLAY AT(R,19):SEG$(A$,
1,10)ELSE 950 !011
950 R=R+1 :: IF R=15 AND N$<
>"0" THEN CALL PAUSE(0):: CA
LL HCHAR(6,1,32,608):: R=6 :
: GOTO 930 !117
960 IF N$<>"0" THEN I=I+2 ::
 GOTO 910 ELSE O$=SEG$(A$,1,
10)!114
970 IF SEG$(O$,LEN(O$),1)="
" THEN O$=SEG$(O$,1,LEN(O$)-
1):: GOTO 970 !255
980 DISPLAY AT(R+1,1):"Thus
there are";VAL(E$);"files ";
"on ";"this ";"disk." !187
990 E=VAL(E$)-1 :: H=VAL(H$(
E)):: DISPLAY AT(R+4,6):"Thu
s, for example, word":STR$(E
)&" ";"of ";"sector ";"1 ";"
points ";"to ";!070
1000 DISPLAY AT(R+6,1):"sect
or ";STR$(H)&", ";"where ";"
the ";"header ";"for ";O$&"
";"is ";"found." !155
1010 SUBEND !168
```

Multiple columns for BOOT

How to increase the number of menu options beyond 24

By COL CHRISTENSEN

The program, BOOT, is now used widely by floppy drive and RAMdisk owners. Some hard drive users also find its new features a benefit for many of their applications. Its 24 menu options provide a wide selection of programs that can be quickly loaded by a simple keypress.

Now that RAMdisks of greater than 256K (even up to 1.5 Meg.) bytes are being built, owners of these are finding that the provision of just 24 options is a little restrictive. We're never satisfied, are we? Just think though, without a want or need for something better there would never be progress. We might still be making do with things like the "OLD CSI" command.

One way to increase the number of menu options is to have two copies of BOOT, with the second version renamed, so that if the first menu doesn't show the required program, pressing a particular option will load the second program with its menu of 24 options. More than two copies of BOOT could be likewise be chained if need be.

One problem that raises its ugly head with that system is the method of configuring each menu. Once you configure the menu and agree to save the alterations back to disk, the whole boot program in memory complete with alterations gets saved back to disk as BOOT/BOOU. How does it know to use this filename? Simple. The filename is contained in the code of the boot program. But what if you renamed the program files to COOT/COOU for your second menu program and configured it with 24 more menu options? When you save that configuration back to disk, it gets saved as BOOT-BOOU overwriting the original files. This happened to me quite a number of times until I woke up to what was happening and I became quite adept at retyping the menu names and filenames to repair my first BOOT program. What I should have done was to use a sector editor to change the filename imbedded in the program from BOOT to COOT.

Anyway there had to be some other way to use more than one menu list with my 1Mbyte RAMdisk without having to go in with a sector editor and modify code in the multiple copies of BOOT/BOOU. Finally a method came to light when I was playing around with the "[" and "]" keypress facilities. The latter will save ("Put" — to quote the screen prompt) a list of your menu names and filenames to a DV/80 file under a filename of your choice. The other keypress will retrieve (Get) them from disk and instal them in the current copy of BOOT in memory. This is a terrific addition to BOOT and would have save me much retyping had I known of it earlier.

You have probably guessed by now how you can have multiple menus using just one copy of BOOT/BOOU on the RAMdisk. Yes, its by having multiple menu lists. These load very quickly following the "[" keypress and in an instant the next menu is on the screen.

Now a few tips on how to set up a number of menu lists. First, though, configure your BOOT program with your most com-

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BOOT MENU—

(Continued from Page 25)

monly used programs on its menu. Press "]" and save (Put) the menu list to "DSKn.1-CFG" where n is your RAMdisk number.

Remember! Your BOOT menu list is to be saved under DSKn.1-CFG, the second menu as DSKn.2-CFG and any further menus as DSKn.3-CFG etc. Now you can configure the defaults in the BOOT program.

Do not press Enter after typing these defaults: In turn enter your defaults for the following keypresses:

"1" Directory
"2" View a File
"3" Run
"X" Xrun
"P" printer devicename
"D" delete a file
"T" track disk

Do this by pressing the key, typing the default and finish by pressing Back to escape.

Press "]" and type "DSKn.2-CFG" for the "Put" default and press Back to escape. Do not press Enter.

Next press the "F" key sequentially until your favourite foreground colour appears on the screen then press the "B" key to set the background colour.

Your defaults are now housed in the BOOT program in memory and all you have to do is to save it all back to the RAMdisk. The only way to do this is to go back to editing the menu list. Press FCTN/5 to get to the screen editing mode, then FCTN/9 and you will be asked which drive number to save BOOT to. Once you have typed your RAMdisk number, you can then press the Enter key. Press Back in answer to the next question about GRAM number.

After the above, you can set up all the other menus that you need. It would probably be best to load a copy of BOOT/BOOU from your original disk that lists a menu of "option 1" to "option 24". Do not press Enter until advised. Press FCTN/5 and type in each of the program names and related filenames. Make one of the program options "FIRST MENU" and the related filename to load as DSK .BOOT. Then press FCTN/9 twice if you want to do the other two screens of options. When you have finished editing, again press FCTN/9 twice to escape. What you want to do is to save (Put) the list of program names and filenames only to the RAMdisk by pressing "]". After the "Put:" prompt, type DSKn.2-CFG for the second menu (or DSKn.3-CFG for the third and so on) and press Enter.

Repeat the above paragraph for any subsequent menus you need. Press FCTN/= to quit and if auto power-up is ON, your first menu appears on the screen. If you want to use one of the other menu lists, simply press "[" and the default "Get: DSKn.2-CFG" appears. Press Enter to load the second menu list. Slick, huh? (I'm intrigued by that "huh" used by a number of our overseas counterparts). For any other list, type over the "2" with whichever menu list you want. Slick again, huh?

All subsequent menu lists will have an option called "FIRST MENU" for loading BOOT so it's an easy matter to return to it. To get from the second menu to any other menu even the first one, press "[" and change the "2" in "Put: DSKn.2-CFG" to whichever you want.

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11. I certify that the statements made by me above are correct and complete. Signature and Title of Editor, Publisher, Business Manager, or Owner: Laura Burns, Managing Editor

PS Form 3526, Feb. 1989 (See instructions on reverse)

Booth space available at Chicago TI Faire

Exhibitors may rent booths for the Chicago TI International Worlds Faire Nov. 2 at the Holiday Inn in Elk Grove, Illinois, at $60 per booth space until the end of September and at $75 per space thereafter.

Faire manager Hal Shanafield says there is no limit on tables per vendor this year. The club will rent systems to vendors on a first come, first served basis at $15 per each basic TI99/4A system. Vendors needing other equipment are asked to write Shanafield at 2515 Marcy, Evanston IL 60201, or (708) 864-8644.

The Faire begins Nov. 1 with a social mixer from 8 p.m. until midnight. Tickets to the mixer are $5 per person. Admission to the Faire Nov. 2 is $4 per person, and a dinner after the Faire is $15 per person.

Shanafield noted that the special Faire reservation rates are available only by call-ing the Elk Grove Holiday Inn, not through Holiday Inn's national 800 number. Phone number for the Holi-

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Flags of Europe

How's your knowledge of geography?

By WALTER CHMARA

Back in the days when my TI was fresh out of the box, I was giddy with anticipating what this little black and silver box with keys could do. Bill Cosby's ads had won me over (with a little help from the advertised price of $199.99!).

I remember having to hook it up to a spare black and white TV, so as not to infringe upon the viewing habits of my family. Following the manual with the glee of a mad scientist, I slowly acquired familiarity with GOSUB and CALL VCHAR. Amazing what a sense of power one gets from redefining the shape of the letter "A" and controlling its destiny on the screen!

Naturally, I had to get my own color TV to fully appreciate CALL COLOR. And what good was it to write simple programs without another peripheral on which to store them? Cassette recorders were a mixed blessing: cheap, but storing long programs to the monotonous sound of pebbles being swirled in Tupperware soon lost its novelty. In those good ol' days, software was easily obtainable by simply walking into any decent retail store. TI was sending newsletters out to owners. "Free Speech" at that time meant that by buying a certain amount of command modules, you could give your machine the power to vocally chat at no extra cost!

And there were books. As silly as it might sound, I still poke my nose into the computer sections of bookstores at the mall, hoping that maybe someone has — just for the heck of it — released something new on the TI-99/4A. Books and a cartridge called "TI Extended BASIC" taught me the magic of sprites.

It was at this point in time that I had sat down and flow-charted out a simple quiz program that was soon to grow into a colorful, memory-filling, beeping, speaking, and blinking delight. Looking back through my archives, I find that though through enthusiasm I started creating quite a few original programs, this is the only one I ever definitely finished, even though I had to slightly alter it to reflect some but not all of the recent political changes.

Set the Alpha Lock down and prepare to hop all over the Old World!

Yet another computer quiz? Yes and no. Actually, this program only asks you one question: "WHAT IS THE NAME OF THIS NATION?" Your answer depends upon the color graphics you see at a given moment.

National flags are colorful and distinctive representations of equally colorful and distinctive peoples. Your TI's expanded memory is your passport, and your Extended BASIC module is your visa to 26 European countries.

Three opening screens explain all you need to know to embark on your random jaunt through the republics. Next, two boxes appear at the top of your screen. The one on the left unfurls the banners one by one, while on the right, a winking sprite calls attention to the general location of the particular country on a special map of the continent. Almost all of the flags completely fill the the 3:5 ratio rectangle of the left box, except for the square Swiss flag.

Your typed-in answer is analyzed in the lower half of the screen, where the computer lets you know whether or not you have identified the nation in question, visually and vocally (with randomly selected phrases of encouragement or consolation. If you don't get it right in three tries, don't sweat, you'll be told where you are before you move on.

When the Union Jack is raised, it doesn't matter whether you enter "Great Britain", "United Kingdom", or, simply, "England"; you'll score a point just the same. "Germany" can be "West Germany" for history's sake, and "Holland" can be identified as "The Netherlands".

Playing "Flags of Europe" will sharpen your recognition of them, as well as give you a simple geography lesson with each game.

And you may learn to spell "Czechoslovakia"!

FLAGS

```
20 ! FLAGS OF EUROPE !181
50 ! COPR. 1985 WALT CHMARA
!032
60 ! VERSION 2 COPR. 1990 !1
44
70 ! BY WALTER CHMARA !249
80 ! TI EXTENDED BASIC !051
90 !!131
100 CALL SCREEN(15):: P$="00
" :: A$=RPT$("F",16)&P$ :: B
$=SEG$(A$,1,8):: C$=B$&"FF"
:: E$="C0F03C0F03" :: F$="FF
FF" !192
110 G$=RPT$("AA55",4):: H$="
F0F0F0F0" :: O$="000000" !20
9
120 I$="0F0F0F0F" :: J$=RPT$
("01",8):: DISPLAY AT(10,7)E
RASE ALL:"FLAGS OF EUROPE" !
131
130 DISPLAY AT(18,5):"SET AL
PHA LOCK DOWN" :: DISPLAY AT
(20,3):"AND PRESS ""S"" TO S
TART!" !061
140 CALL KEY(0,K,S):: IF K=8
3 THEN 150 ELSE 140 !228
150 DISPLAY ERASE ALL:"THE N
ATIONS IN THIS PROGRAM:" ::
PRINT :: RESTORE 1480 :: FOR
 Z=1 TO 13 :: READ K,K$,L,L$
 :: PRINT K$,L$ !212
160 NEXT Z :: CALL CHAR(35,J
$&O$&O$&"00FF"&RPT$("80",8))
:: CALL CHAR(91,"000010107C1
```

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CHICAGO FAIRE—

(Continued from Page 26)

day Inn Elk Grove is (312) 437-6010, or write the facility at 1000 Busse, Elk Grove, IL 60007.

For more information, write Chicago TI Users Group, P.O. Box 578341, Chicago, IL 60657, or call the group's hotline, (708) 869-4304.

Shanafield says the Faire will again be held in conjunction with the Milwaukee TI Faire Nov. 3. For information on the Milwaukee Faire, contact Gene Hitz, Milwaukee Area 99/4A Users Group, 4122 North Glenway, Wauwatosa, WI 53222.

FLAGS—

(Continued from Page 27)

```
010"&O$&"4428102844"):: PRIN
T !048
165 CALL SAY("YOU MUST KNOW
HOW TO SPELL IN THIS PROGRAM
.")!095
170 CALL CHAR(34,"FF"):: CAL
L CHAR(61,O$&"00FF"&O$&"0020
1008FC08102"):: FOR Q=9 TO 1
2 :: CALL COLOR(Q,2,5):: NEX
T Q !031
180 DATA 00000000073F7FFF000
00000C0E0F3F1000000603838000
001030F1F19010D !102
190 DATA F3F3F7E7CFCFC1C7C3C
7FFFFFFFFFFF0302030309193B1
B0000008080C0E1E3 !085
200 DATA 0C0C071F3FFFFFF071
FBFFFFFFFFFF3107000303010000
0C30F3FFFFFFFFF !209
210 DATA 007FFFFFFFF7F7FFFF
FFFFFCE0E0E0FFF9F8FC1E4F074
3FF7F7F3F1F0F86C7 !094
220 DATA FFFFC98B81C83E7F7F0
F0200030F1F7FC0C0001FFFFFFF
F430103ECE0E0F8FF !152
230 DATA 7F7F000C0001C3E3000
0000000074FFF000000ECCED797F
FFFFFBF3F1F9F8FCF !033
240 DATA E7E7E7E3E3F3F3F3FBF
BFCFCFFFFFFFE08000FFFEFEFEF
E !161
250 RESTORE 180 :: FOR Q=96
TO 122 STEP 4 :: READ Q$ ::
CALL CHAR(Q,Q$):: NEXT Q ::
CALL CHAR(123,A$):: PRINT TA
B(9);"PRESS ANY KEY" !171
260 CALL KEY(0,K,S):: IF S=0
 THEN 260 ELSE 270 !162
270 DISPLAY AT(4,1)ERASE ALL
:"#                %#||||`auv
%" :: CALL HCHAR(3,4,36,15):
: CALL HCHAR(3,21,36,8)!144
280 DISPLAY AT(5,1):"#  A FL
AG WILL  %#b||cde{{%" :: DIS
PLAY AT(6,1):"#  APPEAR HERE
  %#|fghi{{{%" !252
290 DISPLAY AT(7,1):"#  & A
BLINKER  %#|jk{{{{{%" :: DIS
PLAY AT(8,1):"#  WILL APPEAR
  %#|lmnop{{%" !056
300 DISPLAY AT(9,1):"#  ON T
HE CLUE  %#|qrs|t{{%" :: DIS
PLAY AT(10,1):"#  MAP THERE=
>  %#k{{{{{w{%" !169
310 DISPLAY AT(11,1):"#
          %#{{{{{{x{%" :: DI
SPLAY AT(12,1)BEEP:"#
        %#{{{{{{yz%" :: CALL
 HCHAR(13,4,34,15)!061
320 CALL HCHAR(13,21,34,8)::
 DISPLAY AT(14,1):"YOU MAY E
NTER 1 OR 2 WORDS  IN THIS S
PACE TO CORRECTLY  IDENTIFY
THE NATION." !198
330 DISPLAY AT(18,1):"IF YOU
 MISS 3 TIMES, I'LL  GIVE Y
OU THE RIGHT ANSWER  AND PR
OC'D TO THE NEXT FLAG." !180
340 DISPLAY AT(24,9):"PRESS
ANY KEY" :: CALL KEY(0,K,S):
: IF S=0 THEN 340 !038
350 FOR Q=14 TO 24 :: CALL H
CHAR(Q,1,32,32):: NEXT Q ::
DIM N$(26,2):: RESTORE 1480
:: FOR V=1 TO 26 :: READ N$(
V,1),N$(V,2):: NEXT V !010
360 S=0 :: RANDOMIZE :: FOR
V=26 TO 1 STEP -1 :: N=INT(R
ND*V)+1 :: FOR Z=1 TO 200 ::
 NEXT Z :: CALL HCHAR(18,12,
32,11)!054
370 NO=VAL(N$(N,1)):: CALL C
HAR(128,A$):: Q$=N$(N,2)!000
380 ON NO GOTO 490,500,510,5
20,560,570,580,590,600,790,7
30,740,750,760,820,830,850,8
70,880,770,780,930,1030,740,
530,650 !161
383 RANDOMIZE :: TKPK=INT(RN
D*3)+1 !156
385 IF TKPK=1 THEN CALL SAY(
"WHAT IS YOUR GUESS")ELSE IF
 TKPK=2 THEN CALL SAY("SEE I
F YOU CAN NAME THIS ONE.")EL
SE CALL SAY("ANSWER THIS IF
YOU CAN")!127
390 DISPLAY AT(14,1):"WHAT I
S THE NAME OF THIS  NATION
?" :: FOR T=1 TO 3 :: ACCEPT
 AT(17,1)BEEP VALIDATE(UALPH
A)SIZE(15):T$ !098
400 IF T$="GREAT BRITAIN" OR
 T$="UNITED KINGDOM" THEN T$
="ENGLAND" ELSE IF T$="THE N
ETHERLANDS" THEN T$="HOLLAND
" !142
410 IF T$="WEST GERMANY" THE
N T$="GERMANY" !202
420 IF T$=Q$ THEN DISPLAY AT
(19,1)BEEP:"THAT'S RIGHT!" E
LSE 440 !163
430 RANDOMIZE :: TKPK=INT(RN
D*4)+1 :: ON TKPK GOTO 1510,
1520,1530,1540 !160
435 S=S+1 :: GOSUB 1430 :: G
OTO 455 !037
440 IF T=3 THEN DISPLAY AT(1
9,1):"SORRY=>";Q$ ELSE DISPL
AY AT(19,1):"NOPE=>TRY AGAIN
!" :: CALL SAY("% #TRY AGAIN
#")!068
450 GOSUB 1430 :: NEXT T !08
7
455 CALL DELSPRITE(ALL):: E=
4 :: G=12 :: H=32 :: GOSUB 1
460 :: CALL HCHAR(16,1,32,26
)!079
460 N$(N,1)=N$(V,1):: N$(V,1
)=STR$(NO):: N$(N,2)=N$(V,2)
:: N$(V,2)=Q$ :: NEXT V !133
465 CALL SPGET("PROGRAM",PRO
$):: CALL SPGET("WITH",WITH$
):: PRO$=SEG$(PRO$,1,35)&SEG
$(WITH$,1,25)!045
470 DISPLAY AT(5,5)ERASE ALL
:"YOU GOT";S;"OUT OF 26" ::
IF S<15 THEN CALL SAY("YOU S
HOULD LEARN THESE IN TIME WI
TH SOME MORE PLAYS"):: GOTO
475 !253
471 IF S<=25 THEN CALL SAY("
YOU HAVE DONE WELL BUT YOUR
NOT AT THE TOP YET")!045472
IF S=26 THEN CALL SAY("GOOD
GOING. YOU ARE NOW A",PRO$)!
086
475 CALL CHARSET :: DISPLAY
AT(12,1):"WANT ANOTHER GO AT
 IT? Y" !176
480 ACCEPT AT(12,24)VALIDATE
("YN")SIZE(-1):R$ :: IF R$="
Y" THEN RUN ELSE STOP !248
490 F=5 :: B=16 :: C=7 :: Y=
53 :: X=178 :: GOTO 1170 !10
9
500 F=2 :: B=12 :: C=7 :: Y=
49 :: X=181 :: GOTO 1170 !10
1
510 F=13 :: B=16 :: C=7 :: Y
=59 :: X=188 :: GOTO 1170 !1
64
```

(See Page 29)

FLAGS—

(Continued from Page 28)

```
520 F=13 :: B=16 :: C=12 ::
Y=44 :: X=169 :: GOTO 1170 !
202
530 F=5 :: B=11 :: C=7 :: Y=
55 :: X=196 !003
550 GOTO 1170 !229
560 F=2 :: B=7 :: C=11 :: Y=
47 :: X=184 :: GOTO 1220 !15
1
570 F=7 :: B=16 :: C=3 :: Y=
52 :: X=193 :: GOTO 1220 !15
3
580 F=7 :: B=16 :: C=5 :: Y=
50 :: X=183 :: GOTO 1220 !15
2
590 F=7 :: B=16 :: C=7 :: Y=
51 :: X=189 :: GOTO 1220 !16
1
600 F=16 :: B=3 :: C=7 :: Y=
58 :: X=199 :: CALL CHAR(130
,B$&O$&"00081C0814"&O$&O$&"8
0C0E0C0CCFF000001030703333FF"
)!189
610 CALL CHAR(134,"F3C"&O$&"
0E0E0C0"&O$&P$&F$):: CALL CH
AR(137,"0002060E1E3FFFFF0040
607078FCFFFF000C0C640C0C0C0C
FFFF7F3F13")!010
620 CALL CHAR(141,"0CEE0C6C0
03C00C3FFFFFEFCC8")!037
630 CALL SPRITE(#2,137,11,27
,33,#3,131,7,26,41,#4,138,11
,27,49,#5,135,7,35,33,#6,135
,7,35,49)!159
640 CALL SPRITE(#7,134,16,33
,41,#8,132,16,41,33,#9,133,1
6,41,49):: GOTO 1220 !233
650 F=5 :: B=16 :: C=7 :: Y=
55 :: X=193 :: CALL CHAR(130
,"C381818181"&O$&B$&O$&"00C0
E0F8FCFEFFFFFF03070F1F3F7F"&
F$)!214
660 CALL CHAR(134,"40E0E0404
"):: CALL CHAR(137,F$&"E7E7E
7C3C381"&F$&B$&"C0F0"&F$&B$&
"00008181")!018
670 CALL CHAR(141,B$&F$&"030
FF8FC"&F$&B$&O$&"80C0E0F0F")
!246
680 CALL CHAR(40,O$&"0103070
F0F1F3F7"&F$&B$&"0F0E0E0C0C0
C0800F0F070707030303")!141
690 CALL CHAR(44,"60E0C0C3C7
DEFCF0041C3C70E0C0800080C0F0
3C1C0400000E0783E3F33B1F0F")
!004
700 CALL SPRITE(#2,44,11,72,
72,#3,45,11,69,80,#4,46,11,7
0,86,#5,47,11,72,91,#6,132,1
6,57,65)!117
710 CALL SPRITE(#7,133,16,57
,97,#8,134,16,63,72,#9,134,1
6,63,95,#10,131,16,49,65)!01
9
720 CALL SPRITE(#11,131,16,4
9,71,#12,131,16,49,91,#13,13
1,16,49,99,#14,130,5,41,81):
: CALL COLOR(2,11,7):: GOTO
1220 !089
730 F=7 :: B=16 :: Y=56 :: X
=183 :: GOTO 1280 !090
740 F=16 :: B=7 :: Y=44 :: X
=193 :: GOTO 1280 !088
750 F=6 :: B=12 :: Y=35 :: X
=190 :: GOTO 1320 !120
760 F=16 :: B=6 :: Y=34 :: X
=197 :: GOTO 1320 !130
770 F=7 :: B=1 :: D=5 :: C=1
6 :: Y=33 :: X=187 :: GOTO 1
340 !148
780 F=5 :: B=1 :: D=7 :: C=1
6 :: Y=33 :: X=161 :: GOTO 1
340 !140
790 CALL COLOR(13,6,16):: E=
4 :: G=12 :: H=128 :: GOSUB
1460 :: FOR Q=5 TO 11 STEP 2
 !110
800 CALL HCHAR(Q,9,129,10)::
 NEXT Q :: CALL HCHAR(6,4,12
9,5):: CALL HCHAR(9,4,129,5)
:: CALL HCHAR(11,4,129,5)::
CALL VCHAR(4,6,129,5)!198
810 Y=60 :: X=196 :: GOTO 13
90 !142
820 M=15 :: GOSUB 1440 :: CA
LL HCHAR(7,4,130,15):: CALL
HCHAR(8,4,131,15):: CALL VCH
AR(4,8,129,9):: Y=38 :: X=18
7 :: GOTO 1390 !222
830 M=10 :: GOSUB 1440 :: CA
LL HCHAR(7,6,130,6):: CALL H
CHAR(8,6,129,6):: CALL HCHAR
(9,6,131,6):: FOR Q=8 TO 9 :
: CALL VCHAR(5,Q,129,7)!197
840 NEXT Q :: Y=53 :: X=183
:: GOTO 1390 !245
850 CALL COLOR(13,12,9,14,16
,5):: CALL CHAR(128,G$):: CA
LL CHAR(136,A$):: E=4 :: G=6
 :: H=128 :: GOSUB 1460 !254
860 E=7 :: G=9 :: H=136 :: G
OSUB 1460 :: E=10 :: G=12 ::
 H=137 :: GOSUB 1460 :: Y=46
 :: X=181 :: GOTO 1390 !239
870 CALL COLOR(13,7,12):: E=
4 :: G=12 :: H=128 :: GOSUB
1460 :: E=6 :: G=10 :: H=129
 :: GOSUB 1460 :: Y=58 :: X=
172 :: GOTO 1390 !135
880 CALL COLOR(13,7,16):: CA
LL CHAR(130,"000302020F0A7D4
A00C04040F050BE52487D0A0F020
2030052BE50F04040C")!146
890 CALL CHAR(134,I$&I$):: C
ALL CHAR(135,"0704040810E080
80E0202010080701018080E01008
040407010170810202 0E0")!000
900 E=4 :: G=10 :: H=129 ::
GOSUB 1470 :: CALL VCHAR(4,1
1,134,9):: E=12 :: G=18 :: H
=128 :: GOSUB 1470 !153
910 CALL HCHAR(5,5,130):: CA
LL HCHAR(5,6,131):: CALL HCH
AR(6,5,132):: CALL HCHAR(6,6
,133):: CALL SPRITE(#2,135,5
,33,33,#3,136,5,33,41)!121
920 CALL SPRITE(#4,137,5,41,
33,#5,138,5,41,41):: Y=65 ::
 X=186 :: GOTO 1390 !137930
CALL COLOR(2,12,7,13,12,13,1
4,12,7):: CALL CHAR(40,"0018
1C080000F80000183810000001F00
21130A06040CF810808083BCC")!
024
940 CALL CHAR(44,"60C"&O$&O$
&"0000080C0E0F000FE"&O$&B$&B
$&"FF7E7E7E3C"):: CALL CHAR(
93,O$&"0018181800DBDBDB00181
818")!202
950 CALL CHAR(128,O$&O$&O$&"
00000738C"&O$&O$&O$&"3041817
3C307058CC83")!076
960 CALL CHAR(132,"878C9890E
0F09F81828244442C3817080601"
&O$&O$&"0000C03807"):: CALL
CHAR(136,O$&O$&O$&"0000C0B88
E80800061"&O$&O$&"8686")!231
970 CALL CHAR(140,"20F0181C3
46242E3"&O$&O$&"804021130A06
040CF800F11905030739C141")!1
73
980 E=4 :: G=8 :: H=128 :: G
```

(See Page 30)

FLAGS—

(Continued from Page 29)

```
OSUB 1470 :: E=9 :: G=18 ::
H=136 :: GOSUB 1470 !206990
DATA 130,129,137,141,131,138
,139,140,132,138,139,143,133
,40,41,42,134,135,43,44 !164
1000 RESTORE 990 :: FOR Q=6
TO 10 :: FOR R=7 TO 10 :: RE
AD A :: CALL HCHAR(Q,R,A)::
NEXT R :: NEXT Q !102
1010 CALL SPRITE(#2,45,13,65
,56,#3,93,5,50,61,#4,94,5,58
,61,#5,46,16,50,61,#6,47,16,
58,61):: Y=58 :: X=167 :: GO
TO 1390 !253
1020 CALL SPRITE(#10,51,12,4
5,90,#11,51,12,45,64):: Y=42
 :: X=189 :: GOTO 1390 !228
1030 CALL COLOR(2,7,16,13,5,
16,14,7,16):: CALL CHAR(40,C
$&"F8F8F8"&O$&E$&O$&"030F3CF
0C0030F3CF0C")!221
1040 CALL CHAR(44,E$):: CALL
 CHAR(128,C$&"FCF0C0FFFCF0C"
&O$&O$&O$&"30F3FFF030F3F"&C$
)!048
1050 CALL CHAR(132,"FF3F0F03
00"&O$&C$&"3F0F03C0F0FC"&C$&
O$&"00C0F0FCFF"):: CALL CHAR
(136,RPT$("1F",8)&B$&B$&RPT$
("F8",8)&O$&C$)!056
1060 CALL CHAR(140,C$&O$&"1F
1F1"&C$&C$&"F1F1F1FF8F8F8"&C
$):: E=4 :: G=12 :: H=124 ::
 GOSUB 1460 :: CALL VCHAR(4,
10,136,9)!106
1070 CALL VCHAR(4,12,138,9):
: CALL HCHAR(7,4,139,15):: C
ALL HCHAR(8,4,137,15):: CALL
 HCHAR(9,4,140,15):: CALL VC
HAR(4,11,137,9)!174
1080 DATA 7,10,141,7,12,143,
9,10,142,9,12,40,4,4,41,4,5,
132,4,6,133,5,4,134,5,5,135,
5,6,41 !175
1090 DATA 5,7,132,5,8,133,6,
6,134,6,7,135,6,8,41,6,9,132
,10,6,128,10,7,129,10,8,42,1
0,9,130 !249
1100 DATA 11,4,128,11,5,129,
11,6,42,11,7,130,11,8,131,12
,4,42,12,5,130,12,6,131,4,16
,128,4,17,129 !007
1110 DATA 4,18,43,5,14,128,5
,15,129,5,16,43,5,17,130,5,1
8,131,6,13,129,6,14,43,6,15,
130,6,16,131 !244
1120 DATA 10,13,135,10,14,44
,10,15,132,10,16,133,11,14,1
34,11,15,135,11,16,44,11,17,
132,11,18,133,12,16,134
1130 DATA 12,17,135,12,18,44
 !103
1140 RESTORE 1080 :: FOR Q=1
 TO 52 :: GOSUB 1450 :: NEXT
 Q :: CALL SPRITE(#2,41,7,37
,49,#3,41,7,29,33,#4,42,7,85
,33)!039
1150 CALL SPRITE(#5,42,7,77,
49,#6,44,7,77,113,#7,44,7,85
,129,#8,43,7,29,129,#9,43,7,
37,113)!051
1160 CALL SPRITE(#10,43,7,45
,97,#11,42,7,69,65):: Y=44 :
: X=175 :: GOTO 1390 !150
1170 GOSUB 1410 :: E=4 :: G=
8 :: H=128 :: GOSUB 1470 ::
E=9 :: G=13 :: H=129 :: GOSU
B 1470 :: E=14 :: G=18 :: H=
136 :: GOSUB 1470 !020
1180 GOTO 1390 !194
1220 GOSUB 1410 :: E=4 :: G=
6 :: H=128 :: GOSUB 1460 ::
E=7 :: G=9 :: H=129 :: GOSUB
 1460 :: E=10 :: G=12 :: H=1
36 :: GOSUB 1460 !188
1230 IF NO=9 THEN CALL HCHAR
(5,5,130,3):: CALL HCHAR(5,6
,139):: CALL HCHAR(6,5,140):
: CALL HCHAR(6,6,141):: CALL
 HCHAR(6,7,142)!084
1240 IF NO=26 THEN 1250 ELSE
 1390 !045
1250 DATA 6,11,137,7,9,138,7
,10,139,7,11,140,7,12,139,7,
13,141,8,9,142,8,10,143,8,11
,136 !132
1260 DATA 8,12,40,8,13,41,9,
10,42,9,11,136,9,12,43 !103
1270 RESTORE 1250 :: FOR Q=1
 TO 14 :: GOSUB 1450 :: NEXT
 Q :: GOTO 1390 !104
1280 CALL CHAR(136,"80C0E0F0
F8FCFEFFFFFEFCF8F0E0C08080C0
E0F0F0E0C080"):: GOSUB 1420
:: E=4 :: G=7 :: H=128 :: GO
SUB 1460 !060
1290 CALL HCHAR(8,4,130,15):
: E=9 :: G=12 :: H=129 :: GO
SUB 1460 :: IF NO=24 THEN 13
00 ELSE 1390 !120
1300 R=7 :: FOR Q=5 TO 8 ::
CALL VCHAR(Q,Q-1,124,R):: R=
R-2 :: NEXT Q :: FOR Q=4 TO
7 :: CALL VCHAR(Q,Q,136):: N
EXT Q !077
1310 CALL SPRITE(#2,138,5,57
,57,#3,137,5,65,49,#4,137,5,
73,41,#5,137,5,81,33,#6,137,
5,89,25):: Y=48 :: X=193 ::
GOTO 1390 !107
1320 GOSUB 1420 :: CALL CHAR
(131,O$&P$&B$):: E=4 :: G=12
 :: H=128 :: GOSUB 1460 !214
1330 CALL HCHAR(7,4,130,15):
: CALL HCHAR(8,4,129,15):: C
ALL HCHAR(9,4,131,15):: CALL
 VCHAR(4,8,129,9):: CALL VCH
AR(4,9,129,9):: GOTO 1390 !1
49
1340 CALL COLOR(2,D,C,13,F,B
,14,D,C):: CALL CHAR(136,B$&
B$):: CALL CHAR(137,H$&H$&B$
&O$&P$&I$&I$&P$&O$&B$)!065
1350 CALL CHAR(141,H$&B$&B$&
H$&B$&I$):: CALL CHAR(40,I$&
B$)!249
1360 E=4 :: G=12 :: H=128 ::
 GOSUB 1460 :: CALL HCHAR(7,
4,140,15):: CALL HCHAR(9,4,1
38,15):: CALL VCHAR(4,7,139,
9)!077
1370 CALL VCHAR(4,9,137,9)::
 CALL VCHAR(4,8,136,9):: CAL
L HCHAR(8,4,136,15):: CALL H
CHAR(7,7,40):: CALL HCHAR(7,
9,141)!092
1380 CALL HCHAR(9,7,143):: C
ALL HCHAR(9,9,142)!147
1390 FOR W=1 TO 3 :: CALL SP
RITE(#1,92,16,Y,X):: FOR Q=1
 TO 50 :: NEXT Q :: CALL PAT
TERN(#1,91):: FOR Q=1 TO 50
:: NEXT Q :: NEXT W !217
1400 GOTO 385 !209
1410 CALL COLOR(13,F,B,14,11
,C):: CALL CHAR(136,O$):: RE
TURN !052
1420 CALL COLOR(13,F,B,14,5,
16):: CALL CHAR(130,B$):: RE
TURN !225
1430 FOR Z=1 TO 500 :: NEXT
Z :: DISPLAY AT(17,1):"" ::
DISPLAY AT(19,1):"" :: RETUR
```

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Newsbytes

Coffey to distribute JP Software titles

Jerry Coffey has announced on several online information services that he will distribute JP Software titles under an agreement reached Aug. 15 with J. Peter Hoddie of JP Software.

According to Coffey, the agreement "owes a great deal to the good offices of Wayne Stith, author of GEN-TRI."

Coffey was planning to ship GEN-TRI by mid-September and says he will announce availability of other titles later.

Coffey says he will work with buyers who have unfulfilled orders.

"If you have evidence of actual payment, e.g., a cancelled check, send me Xerox copies of checks, statements (whatever) and full details so I can ship the software as soon as the masters reach me;

"If your check was never deposited, then please send a new order and I will arrange with Peter to void any previous checks that may turn up."

Coffey asks that all correspondence be as complete as possible. Write him at 9119 Tetterton Ave., Vienna, VA 22182.

RICH GKXB updated

Richard Lynn Gilbertson, author of the RICH GKXB, says the Extended BASIC disk has gone into versions 2.37 and 2.54.

He says Gary Bowser of Oasis Pensive Abacutors has sent him specifications for manufacture of the program as a cartridge.

Gilbertson says he is working on a Disk Manager to be installed on the module. He says no problems have been found with the accelerator and it will work on the TIM card.

Disks of RICK GKXB are available for $24.95 plus $2 shipping and handling from CaDD Electronics, 81 Prescott Rd., Raymond, NH 03077. Phone number is (603) 895-0119.

Miami BBS running

The Miami Users Group BBS is operating at (305) 625-8520. According to Mr. Mosher, sysop, the board is running at 300, 1200 and 2400 baud off a basic TI with a 40 megabyte hard drive.

Asgard releases new products

Asgard Software has released its first Geneve-only program, Thumbnails, by Francisco Garcia. The company has also released a game for the TI99/4A, Starbase Raiders, and a utility for Page Pro 99 users, Gofer.

Thumbnails will organize, catalog and convert MacPaint pictures, according to the manufacturer, and is described as of special interest to users of Page Pro 99, Y.A.P.P. and the Printer's Apprentice for providing access to MacPaint pictures available on BBSes and networks and in user group libraries.

The manufacturer says Thumbnails catalogs disks and finds all the MacPaint pictures on them, then allows the users to view and print them, singly or in batch, either at full-size or in "thumbnail" format.

Thumbnail format is nine to a page, with a box around each and the filename underneath. While being viewed in either full-size or thumbnail format, the pictures may be clipped and saved in either Page Pro or TI-Artist format. At full size, according to the manufacturer, the screen acts as a window on the picture, which may be moved with arrow keys. It is also possible to organize the pictures into a slideshow for rapid viewing.

Thumbnails is said to be compatible with M-DOS 1.14 and 0.97H and with the Myarc HFDC and RAMdisks. Printing requires an Epson or compatible printer, though the manufacturer says the printer can be fully customized otherwise. Suggested retail is $12.95 plus $3 shipping and handling.

Starbase Raiders is an arcade-style game based on a game popular on the Atari 2600. It was written by Joe Delekto, and requires 32K, Extended BASIC or Editor/Assembler and a disk system. Suggested retail is $12.95 plus $3 shipping and handling.

Gofer is a utility described as being for the "power user" who uses Page Pro 99 frequently, written by Dan Eicher. Written in compiled c99, the package features complete rewrites of almost all utilities included with Page Pro 99, plus additional utilities. It includes a columnizer 50 times faster than the Page Pro Columnizer, a program for converting art, a program for modifying page files and a PCX picture converter that will convert pictures created on a PC directly into Page Pro 99

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FLAGS—

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```
N !229
1440 CALL COLOR(13,7,16):: C
ALL CHAR(130,B$):: CALL CHAR
(131,O$&P$&B$):: FOR Q=4 TO
12 :: CALL HCHAR(Q,4,128,M):
: NEXT Q :: RETURN !147
1450 READ A,B,C :: CALL HCHA
R(A,B,C):: RETURN !184
1460 FOR Q=E TO G :: CALL HC
HAR(Q,4,H,15):: NEXT Q :: RE
TURN !233
1470 FOR Q=E TO G :: CALL VC
HAR(4,Q,H,9):: NEXT Q :: RET
URN !201
1480 DATA 1,FRANCE,2,BELGIUM
,3,ITALY,4,IRELAND,5,GERMANY
,6,HUNGARY,7,LUXEMBOURG,8,AU
STRIA,9,BULGARIA,10,GREECE,1
1,MONACO !164
1490 DATA 12,POLAND,13,SWEDE
N,14,FINLAND,15,DENMARK,16,S
WITZERLAND,17,HOLLAND,18,SPA
IN,19,MALTA,20,NORWAY,21,ICE
LAND !097
1500 DATA 22,PORTUGAL,23,ENG
LAND,24,CZECHOSLOVAKIA,25,RO
MANIA,26,YUGOSLAVIA !1081510
 CALL SAY("#EXACTLY#"):: GOT
O 435 !119
1520 CALL SAY("CORRECT"):: G
OTO 435 !039
1530 CALL SAY("#GOOD WORK#")
:: GOTO 435 !235
1540 CALL SAY("YOUR DOING FI
NE"):: GOTO 435 !063
```

Il Pastor Fido

A musical rarety revived

By LAURA BURNS

Since the Baroque revival some time back, Antonio Vivaldi's music has become more accessible to the listening public than perhaps in any time since his own lifetime. Even individuals who do not go out of their way to listen to music of this period have at least heard music from the ubiquitous "Four Seasons."

Though other Vivaldi recordings exist as well, a good deal of Vivaldi's music is still seldom or never heard in performance. Vivaldi, who lived from 1678 to 1741, was a prolific composer, for one thing. (A show of hands, please, from all those familiar with all 124 violin/string concerti by Vivaldi? With half of them?) The Encyclopedia Brittanica says he may have composed more than 800 works.

PERFORMANCE: Harrison Software has produced a disk containing a set of six sonatas, "Il Pastor Fido" (The Faithful Shepherd), written by Vivaldi for the musette, a now-extinct keyboard instrument. From a menu, you select the sonata you wish to hear or you can listen to all (Sonata No. 3 is played second if you select this option because 1 and 2 are in the same key. However, to hear them in the "right" numerical order, you can select each one manually.)

The title and key (e.g., 4 in A) appear on the screen as the music plays. I believe it would have been a good idea to also have the movements listed below this, a paragraph saying something like "Sonata in four movements, 1. Allegro, 2. Adagio, etc."

The manufacturer says the computer sound chip sounds much like the musette. A non-computing acquaintance came by as I had the disk playing and commented, "That sounds a lot like a harpsichord." As to the quality of the "performance," it sounds flawless. Surely it takes as much skill to execute counterpoint by way of a programming keyboard as on one made of ivory. The sound of the disk drive between movements is no more distracting than audience noise at a concert.

Music of this type is "artificial," I suppose, but so is the fact that you can turn your radio on and hear Elvis.

EASE OF USE: My kind of program, load it from Extended BASIC and select from a menu.

It should be noted that the program is not Geneve-compatible.

DOCUMENTATION: The documentation gives information about the composer (not enough to let you know, though, that, though a priest, he caused almost as much gossip as rock stars today), about the music performed and about the musette. It is brief, but no more so than lots of liner notes. The real deficiency lies in not delineating the movements, as noted above.

VALUE: You can find tapes for about

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Review

Report Card

Performance	**A**
Ease of Use	**A**
Documentation	**A-**
Value	**A**
Final Grade	**A**

Cost: $6, shipping included
Manufacturer: Harrison Software, 5705 40th Place, Hyattsville, MD 20781
Requirements: TI99/4A, Extended BASIC, 32K and one DS/SD or SS/SD drive

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format.

Gofer requires Page Pro 99 and is compatible with hard disks and RAMdisks. Suggested retail is $12.95 plus $3 shipping and handling ($5 airmail).

To order, send a check or money order to Asgard Software, P.O. Box 10306, Rockville, MD 20849.

Harrison produces file transfer program

Harrison Software has released Smart Connect, a program with which TI owners can transfer text files to and from PC computers.

According to Bruce Harrison of Harrison Software, the package can take large files from the PC and automatically split them into files small enough to be used with TI-Writer or Editor/Assembler editors on the TI side. The program will autoincrement the names of these split files, so that if the first one is TEXT1, the file will be split into TEXT1, TEXT2, etc.

The package is designed so that, once the program is at the PC end, all actions are controlled from the TI keyboard and the PC therefore can be unattended while transfers are being done, Harrison says. Two GW-BASIC programs for the PC are supplied. At the end of the session, the TI program will cause the PC program to end before ending itself.

The package, which sells for $10 including shipping and handling, requires 32K, at least one SS/SD drive, RS232 and a PC with GW-BASIC. The package can run from Extended BASIC, E/A or TI-Writer modules. Instructions and an XB program to print them are included on the disk. Numerous "error traps" are included, Harrison says, so that even errors on the PC program will be reported on the TI screen and can be recovered from it without any action at the PC itself.

Harrison notes that Harrison Software's Word Processor has been reduced in price from $20 to $14, including shipping and handling.

For information or to order, write Harrison Software, 5705 40th Place, Hyattsville, MD 20781.

Send Newsbytes to MICROpendium Newsbytes, P.O. Box 1343, Round Rock, TX 78680.

IL PASTOR FIDO—

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the same price, CDs for $14 or $15 — the price is certainly not out of line by anyone's standards, and I would not hesitate to call it a bargain.

Conclusion: "How can record companies produce albums of Gregorian chants?" my younger son asked me a while back, looking over my shoulder at a music catalog. "I wouldn't think there would be much money in it."

"If they can make a profit after their expenses are covered, it's worth doing," I explained. "They get the big bucks from their Madonna albums or whatever, and this is extra, what you call a niche market."

Technology has made a range of musical styles and high-quality performances available and affordable for both mass and niche audiences. (Think, by contrast, of the heroine of Jane Austen's Mansfield Park, thrilled at learning that her neighbor played the harp, an instrument she had never heard. A small-town girl today would have at least heard one in the background of a commercial.) And this accessibility has resulted from the "standard," mass-market technology. It is mind-boggling even beyond this to hear relatively little-known Vivaldi music on the TI, at least for me.

"Il Pastor Fido" is certainly an interesting illustration of the possibilities inherent in a TI with only a slightly expanded system. Like much of the music on disk from Harrison Software, "Il Pastor Fido" is something of a rarety. According to the text file, "Il Pastor Fido," Opus XIII, is usually omitted in published catalogs of Vivaldi's work. Only two printed copies of the original publication still exist, but modern published copies of the music are now available.

Not only is the music Harrison Software produces on the obscure side to most listeners, but the technology — the TI home computer system — remains obscure to most in the music world. My own hope is that musicologists at some major university are aware of what Harrison Software has made available to listeners. It is a real accomplishment, to my mind.

Personally, I would like to hear a documentary on my local National Public Radio affiliate about the music and Harrison Software's transcriptions of it. The recording of this type of music is interesting in itself; recording by the obscure medium of an orphaned computer is surely worth a little "media attention" beyond the pages of a small computer magazine.

GEN-TRI

Three in one for the 9640

Review

By JERRY COFFEY

This review was downloaded from GEnie. The review was written, edited, filed, and uploaded using GEN-TRI. The author recently became a distributor of GEN-TRI. The review was written several months before he became a distributor. According to the author, the bugs noted in this review have been fixed. The finished version that is being shipped is number V1.02.—Ed.

For several months, I have been using beta versions of Wayne Stith's comprehensive communications, disk management and word processing package called GEN-TRI (pronounced "gentry"). Wayne is the author of TRIAD, a similar combination package for the TI99/4A. GEN-TRI is a much expanded package on the same theme that takes advantage of the features on the Myarc Geneve.

As Assistant System Manager of Delphi's TI NET, I have most of the Sysop duties, including both message traffic and management of the download libraries. I have been using GEN-TRI for all of these functions as it has developed. After hundreds of hours pushing the program to its limits, I can tell you GEN-TRI is a Sysop's dream and an extraordinary tool for keeping in touch with the TI world.

First a few general comments. This is a very large program — it consumes almost all of the 200K reserved for TI99/4A emulation by the TIMODE command on the 9640. It runs in GPL mode under MDOS version 1.14 (used by the author) or version 1.14F (used by this reviewer). Wayne chose this approach because the GPL environment has been stable for a long time — a necessity for developing such a complex package.

All the operating modules reside simultaneously in memory to assure fast switching between functions. This means that a lot of code has to be loaded when the program is initially booted up. A large Horizon RAMdisk or a hard disk is needed for fast loading, though I have tweaked a floppy to do the job in about 30 seconds. Even loading from floppy is less of an inconvenience than it would appear. This is because you can do a lot of things without leaving the program, and many others without reloading from disk by using the RE-ENTER program supplied with the package (more about this later).

TERMINAL EMULATOR

The first module to be completed was the terminal emulator (TE). It operates in simple terminal mode, a split-screen conference mode and ADM3A emulation mode. The TE has 20 configuration options as well as an informative status line that reports space remaining in the buffer, Xon/Xoff status (handy when a noise glitch happens to send an Xoff), elapsed time, add the communications parameters in use. Intelligent (selectable) use of APPEND mode gives all the logging options anyone could want, including 25K blocks with auto-incrementing filenames or a single long log. You can also save or filter out control characters in the log you create and review the contents of the log buffer up to the time you dump it to disk (if you need to

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see something already logged to disk, go to the file transfer screen with F5, select D for disk and a drive number and you can (V)iew the contents of the file on disk).

For file transfers, GEN-TRI supports the usual ASCII and Xmodem protocols, but also 1K-Xmodem (used on GEnie), CISB (used on Compuserve), and a full-blown Ymodem-Batch protocol (available for single files on Compuserve and for batch transfers on Delphi). The more sophisticated protocols (particularly Ymodem) are significantly faster than xmodem, with efficiencies over packet-switching networks of 60-70 percent on Genie and Delphi, and 85-90 percent on Compuserve (measured at 2400 bps). Since the second beta version, all protocols have functioned flawlessly on the three commercial networks and various BBSs, with none of the problems that have turned up with other TEs.

Wayne has taken some pains to accommodate some of the quirks of GEnie as well as the standard protocols of Compuserve (CIS) and Delphi. In my experience Ymodem is the best choice for CIS and Delphi, and 1K-xmodem is good for GEnie. CISB is equally fast on CIS but is not as consistent as Ymodem. Delphi fully supports batch mode uploads in Ymodem, so GEN-TRI saves me lot of hassle with the housekeeping chores on TI NET. This also makes it easy to take advantage the "group" structure available on Delphi — just set up the group description and upload the files in batches (up to five at a time).

The trendy choice of protocols these days is Zmodem, but after reading Chuck Forsberg's Zmodem specifications, I tend to agree with Wayne and others who still regard Ymodem (also a Forsberg creation) as the best compromise in the world of noisy lines and imperfect packet-switching networks. Zmodem has advantages at very high transfer speeds, but Ymodem works well at 2400 bps in adverse conditions and gets efficiencies of 90-98 percent under good conditions. Zmodem support software is newer and is still being refined on the commercial networks. Thus Zmodem implementations may end up better tuned to current network performance, particularly on Delphi and GEnie where there is still significant room for improvement. Wayne has anticipated this potential by providing a hook for adding new modules to GEN-TRI to support other protocols.

File transfers are managed from a setup screen that includes a disk cataloger with file marking and viewing capability and pop-up windows to select such things as communication parameters, protocol and sequences of file names for batch uploads. The setup screen also manages a 100K+ buffer (quasi RAMdisk) for sending and receiving files. Once a binary transfer has begun, a second screen tracks progress in sectors, 128-byte records, and total bytes. It also displays two real-time measures of transfer rate. There is a cosmetic bug that shows up in the transfer rate display — in rare instances the displayed rates go to zero and stay there. One caution about the download buffer — it will accept duplicate filenames which can cause problems. If you get a bad download to the buffer, save ("flush") the other files in the buffer to disk and clear the buffer before you try it again with the same filename.

Some of the most powerful features of the TE module are found in its terminal modes. The conference mode is not unique but it works very well. In this mode, you can type messages into a window at the bottom of the screen and they are sent when you press Enter. This avoids having incoming messages inserted between the keystrokes of the message that you are composing. It also retains the last five lines you have typed after they may have scrolled off the main screen.

Another feature I use frequently is the "macro" function. You can create up to ten macros that can be selected from the menu and sent with a carriage return. Each macro can be anything from a one-line command to a script file saved on disk. These script files are the most powerful feature of the TE module. Wayne has developed a compiled language that is like a subset of Extended BASIC for automating communications. The script processor can execute either the compiled code or compile the readable source code and execute it on the fly. (The compiled version runs quicker and is more compact on disk.) Scripts can be used to create autodialer/logon menus for literally hundreds of BBSs that can be invoked with a few keystrokes. Wayne has also included sample scripts to show how this is done.

DISK MANAGER

The second module finished was the disk manager (DM). The File operations function of this module has a full-screen (80-column) editor for entering file commands and many novel commands that operate on different types of files. The 80-column directory screen shows up to 32 files per page and supports a handy 80-column viewer for any D/V80 files on the disk selected.

The Disk operations menu supports sector copies, formatting (40-track only), and file sweeping (zeroing out the bitmap and the sector one pointers to the file headers).

The third function on the menu of disk operations is a very effective (and easy to use) routine to recover deleted files. It will search for file names supplied by the user or scan the entire disk for potential file names. If the file is intact it will rebuild the bitmap entries and directory pointer. The philosophy of this module is conservative to assure the integrity of files and reduce errors that cannot be repaired — files must be unprotected in a separate pass before they can be deleted, and deletions can be recovered by returning immediately to the recover function on the DM menu. You can also move between the TE and the DM without losing data in the download buffer (which has its own file copy function). In addition to the full disk manager, there is a directory command in other modules of GEN-TRI that permits viewing and file tagging.

Now that GEN-TRI has been released, I can tell you about one undocumented function in the DM that was added by the author for debugging purposes. The disk management screen shows four choices, but if you press "5," you bring up a simple sector viewer. This can be useful for a quick look at a problem to decide if a full-blown sector editor is needed. If you invoked GEN-TRI from the E/A module in GPL, you can back out to E/A, run another program (such as a sector editor), and usually re-enter GEN-TRI without reloading it.

WORD PROCESSOR

The third and most complex module is

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the word processor (WP). This is the most ambitious part of the package and unlike any of the TI Writer clones. There was a conscious attempt to use many of the TIW keystroke commands for similar functions in the WP, but there are many new commands and capabilities that do not exist in TIW.

If you press ALT-N in the editor a window is displayed showing about 40 keystroke commands. This was added in beta testing because I (and perhaps others) couldn't remember all the commands in the documentation. Some of these commands such as "mark mode" and "global" bring up additional menus. There are over 40 keystroke commands available for composing and editing text plus a separate "operations" menu. One of the features added after testing was a help screen that displays these commands in a large window when you press ALT-N. You will really appreciate this as you learn the many new features of this word processor.

When WP is invoked from the main GEN-TRI menu, a lot of memory must be cleared out for the code and the text buffer. If there are files in the TE's download buffer, a warning window comes up allowing you to return to the TE and save them before proceeding.

Once you are in the Word Processor, you will immediately notice some major differences from TI Writer. If you check the operations menu you will find you are in document No. 1 of 9! If you have some notes you are writing from, you can load them into another document and refer to them when needed. I also used this capability to set up my own help file (before Wayne added the help screen) — just loaded it into doc No. 9 and referred to it when I couldn't recall a command. The next thing you will notice is there are no line numbers — block moves, copies, and deletes are all done in a highlight-the-text "mark" mode. Wayne gave a lot of time and attention to the user interface here (which will be familiar to users of Word Perfect and similar programs.) I got several opportunities as the work progressed to talk with Wayne about features we liked and didn't like in these other programs.

Your next surprise will come when you decide to insert some text in word wrap mode — the text that follows your insertion moves ahead and wraps down to the next lines — no more split lines. You still may have to do a manual reformat (F2) to keep things neat after deletions. You will also have to become accustomed to the way word wrap works in mark mode — anything you don't want reformatted after a block delete or move should be separated by a carriage return or a blank line. Try toggling into Fixed mode before block operations until you get some practice with it. There is also a bug in word wrap mode that Wayne is still chasing — sometimes a reformat will not stop at a blank line. Until this is fixed, I recommend inserting carriage returns or blank lines (F8) to keep your reformat under control. Another bug you may see in version 1.0 is a rare spillover of text to the 25th line of the screen. Text normally scrolls to keep within the top 24 lines on the screen. If some text gets caught on line 25, just press F9 and then Enter to bring the stray back into the fold.

Since there are no line numbers, you must use marked moves to combine blocks of text. Though nine separate documents can reside in memory, their total size is about the same as the buffer in MY-Word (about twice the size of TI Writer). The GEN-TRI buffer appears to be larger than this, but the storage method Wayne uses to get fast screen handling uses more memory for a given amount of text. The available memory must also provide a temporary buffer for blocks to be moved. If a move runs out of memory, some of the text may be lost (and there is no TEXT BUFFER FULL message to tell you that you blew it).

I have found some rules of thumb to avoid problems: 1) don't try to load more than about 210 sectors into the buffer at one time; 2) keep it to about 160 sectors if you will need to do large block moves; 3) check the bytes available on the status line and do not mark more than this for a move (figure about 2,000 bytes per screen of text); 4) mark and move text in several smaller blocks when space is limited. To keep to these rules, you may need to split up some disk files into smaller parcels — using a program like Tom Freeman's SPLITJOIN or GEN-TRI itself (load a file, move half of it to a second document, then write the halves back to disk separately).

Another innovation is the way GEN-TRI handles printers. This is a critical feature of any word processor and often involves a large investment in writing subsidiary programs called printer drivers (the printer driver library for Word Perfect, for example, takes up about 3 megabytes even with code sharing.) The purpose of these drivers is to make the word processor work the same way with any supported printer. I always found this part of TI Writer cumbersome — transliteration, required spaces, all those dot commands, and a separate program (the Formatter) to interpret it all.

In GEN-TRI's WP, Wayne follows the WYSIWYG (what you see is what you get) philosophy and has incorporated an ingenious system of "macros" that, in effect, allows each user to create his own printer driver. Macros for features such as bold, underline, italic, elite, pica, NLQ have been standardized and there is still room for the user to add macros of his own. The standard macros (just like printer drivers) permit embedded format or printer-control codes in a GEN-TRI file to be completely portable between printers. And the codes themselves are invisible until you enter CNTRL-U mode to add or change macros.

Since macros can produce lines longer than 80 bytes, Wayne has devised a special D/V254 format for saving such files — that way you wont confuse them with TI Writer-style DV80 files. But the WP operations menu also has some other pleasant surprises besides the D/V254 (S)ave operation. For those who need to communicate with other computers that use the common "DOS" or ascii format, your document can be (P)rinted to a disk as a D/FI28 file with a linefeed and carriage return terminating each line, and a CTRL-Z to mark the end of the file. Files in this format can be transferred in binary form (e.g. Xmodem) and then downloaded in readable form by most other computers. This is also compatible with the Xmodem "text" option for uploading to some systems (e.g., Delphi and many BBSs) —

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handy if you need to upload text over a noisy line. This is the same format you see when an ASCII file is downloaded with Xmodem or when you use D/V80-D/F128 conversion programs.

Actually, the (P)rint operations have a lot of options (or switches), though not all combinations are useful. The (G)eneric export switch suppresses all formatting and special characters except carriage returns (similar to TI Writer's "clean printfile" option.) The (N)eed CRLF switch adds the line termination needed by most other computers. The (T)oggle file type switch chooses D/V80 or D/V128 disk format. Selecting the (P)rint operation then allows you to choose either the document in the buffer selected (1 through 9) or the original disk file whose name appears on the Input line. And finally you are given the choice of target devices — screen, disk, or printer.

Overall, the operation of the WP is smooth, natural, fast, and efficient. In fact that is a good description of the whole GEN-TRI package. Each of the modules is well thought out, easy to use, and well integrated into the whole. I spent several thousand dollars of my time testing the package (assuming anyone would actually pay me for this) and I consider a copy of the product to be more than adequate payment. As with any new program, there are still a few loose ends to be tied up. T very fast spelling checker is being revised to avoid a slowdown under certain searches and will be shipped separately. Wayne is also working on an update to fix the bugs I mentioned above. But as shipped it is both the best TE and the best word processor available in the TI world and the addition of the disk manager makes it the best integrated and most productive package I have ever used on any computer.

GEN-TRI is distributed by JP Software. The price is $50. If ordering through Jerry Coffey, make sure that all correspondence be as complete as possible. Write him at 9119 Tetterton Ave., Vienna, VA 22182.

User Notes

Heat index gauges comfort

The following program was written by Allan Cox of Tarrant, Alabama. He writes:

Heat Index is a program that calculates the Heat Index when the Temperature and the Relative Humidity are known. The Heat Index is accurate to within +/- 1.3 degrees F. The Heat Index can be valuable in helping to prevent heat stress, heat stroke, etc.

The program displays the Heat Index answer after inputting the temperature and relative humidity. The relative humidity is to be entered as a whole number, not as a percentage,for example: 55.

As an option, the program can print a hard copy of the temperature, relative humidity, and the heat index. The program uses a parallel PIO output, and this may be changed to suit your needs on line 2200.

It is suggested that no modification be made to the math that determines the Heat Index, as this is an exact equation.

```
100 CALL CLEAR !209
150 ! ************** !239
200 ! * HEAT INDEX * !241
250 ! *      BY     * !210
300 ! *  ALLAN COX * !201
350 ! *    1990     * !202
400 ! ************** !239
450 CALL CHAR(128,"182442818
1422418"):: CALL SCREEN(12):
: CALL COLOR(13,16,7):: CALL
 HCHAR(2,1,128,32):: CALL HC
HAR(23,1,128,32)!252
500 DISPLAY AT(7,7):"* HEAT
INDEX *" !138
550 DISPLAY AT(9,12):"BASED"
 !193
600 DISPLAY AT(11,13):"ON" !
039
650 DISPLAY AT(13,9):"TEMPER
ATURE" !183
700 DISPLAY AT(15,13):"AND"
!098
750 DISPLAY AT(17,6):"RELAT
VE HUMIDITY" !089
800 FOR DELAY=1 TO 700 :: NE
XT DELAY :: CALL CLEAR !160
850 DISPLAY AT(12,5):"Enter
Temperature." !069
900 ACCEPT AT(12,24):T !026
950 DISPLAY AT(15,2):"Enter
Relative Humidity." !102
1000 ACCEPT AT(15,27):R !030
1050 CALL CLEAR !209
1100 A=-42.379 !198
1150 B=2.04901523*T !225
1200 C=10.14333127*R !016
1250 D=.22475541*T*R !203
1300 E=6.83783*(10^-3)*(T^2)
!101
1350 F=5.481717*(10^-2)*(R^2
)!146
1400 G=1.22874*(10^-3)*(T^2)
*R !113
1450 H=8.5282*(10^-4)*T*(R^2
)!067
1500 I=1.99*(10^-6)*(T^2)*(R
^2)!011
1550 HI=INT(A+B+C-D-E-F+G+H-
I)!004
1600 DISPLAY AT(12,7):"HEAT
```

(See Page 37)

READER TO READER

☐ Heino Huenken, 8500 Viscount, Apt. 12-I, El Paso, TX 79925, writes:

I would like to meet or get in touch with someone in the El Paso area who has a Geneve, for questions on how I should expand the system. Currently I am using the TI Monitor and TI Controller.

Huenken notes that he will be in El Paso only until December.

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

User Notes

(Continued from Page 36)

```
...DEX=";HI !162
1650 INPUT "WANT HARD COPY?
(Y/N)":YN$ !072
1700 CALL CLEAR !209
1750 IF YN$="YES" THEN 1900
!180
1800 IF YN$="Y" THEN 1900 !0
26
1850 IF YN$="N" THEN 2700 !0
50
1900 INPUT "IS PRINTER READY
? (Y/N)":YN$ !235
1950 CALL CLEAR !209
2000 IF YN$="YES" THEN 2200
!225
2050 IF YN$="Y" THEN 2200 !0
71
2100 IF YN$="N" THEN 1900 !0
15
2150 CALL CLEAR !209
2200 OPEN #1:"PIO" !253
2250 PRINT #1:CHR$(27)&CHR$(
69)!242
2300 T$=STR$(T)!210
2350 R$=STR$(R)!206
2400 HI$=STR$(HI)!076
2450 P1$=RPT$(" ",7)&"T"&RPT
$(" ",2)&T$ !236
2500 P2$=RPT$(" ",7)&"R"&RPT
$(" ",2)&R$ !233
2550 P3$=RPT$(" ",7)&"HI"&RP
T$(" ",2)&HI$ !105
2600 PRINT #1:P1$&P2$&P3$ !1
70
2650 CLOSE #1 !151
2700 INPUT "WANT ANOTHER? (Y
/N)":YN$ !221
2750 IF YN$="YES" THEN 850 !
150
2800 IF YN$="Y" THEN 850 !25
2
2850 IF YN$="N" THEN 2900 !2
51
2900 END !139
```

Vehicle fuel statistics using TI-Base

The following item is by Bill Gaskill. Gaskill has written numerous articles about using TI-Base, including a tutorial that appeared in MICROpendium. He writes:

The Vehicle Fuel Statistics program that follows requires TI-Base V3.0. It simply cannot be run on any of the earlier versions due to the heavy use of V3.0 enhancements.

The first part of the program is a data base named GAS that you must create on a data disk before doing anything else. The GAS data base file structure is listed below;

FIELD	DESCRIPTOR	TYPE	WIDTH	DEC
1	VEH	C	020	
2	MILESDRIVN	N	006	01
3	GALLONSGAS	N	004	01
4	COSTPERGAL	N	004	02
5	TOTALCOST	N	006	02

The second part of the program is the MPG command file listed below, that analyzes the data that you enter into the GAS data base file.

Each time you put fuel in any of your cars enter the name of the vehicle using a normal description such as DODGE CARAVAN, PONTIAC GRAND AM or whatever, the miles driven since your last fill up, the total number of gallons used, the cost per gallon paid and the total bill for the fill up.

When you have a few entries in the data base run the MPG command file (which should be on the same disk as the GAS data base) and enter the name of the vehicle you wish statistics generated for. MPG will search the GAS database for only those records with the vehicle name specified

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1991 TI FAIRS

MARCH

Family Computer Exposition and Ham Radio Festival, (formerly TICOFF), March 6, Roselle Park High School, 185 West Webster Ave., Roselle Park NJ 07204. Sponsored by students of the high school and the Old Bridge Ham Radio Club. For information write the high school or call (201) 241-4550 or call the 24-hour informational BBS at (201) 241-8902.

APRIL

Canadian TI-Fest, April 27, 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

TI Orphan Reunion, May 11, Innisfail Lions Hall, Innisfail, Alberta, Canada. Contact Fred Kessler, Box 20, Sundre, Alberta, Canada T0M 1X0 or (403) 638-3916.

Multi User Group Conference, May 18, Reed Hall, Ohio State University Lima Campus. Contact the Lima User Group, P.O. Box 647, Venedocia, OH 45894, or phone Dave Szippl evenings, (419) 228-7109.

SEPTEMBER

6th International TI User Treffen, Sept. 13-15, Berlin. Contact Henry Hillsberg, Uhlandstr. 70, (W) 1000 Berlin 31, Germany.

Convention, Sept. 21, South End Pool Center, 402 E. 56th St. Tacoma, Washington. Contact Barb Wiederhold, (206) 546-1865 (BBS) or (206) 546-1205.

NOVEMBER

Chicago International World Faire, Nov. 1-2, Elk Grove Holiday Inn, Elk Grove Village, Illinois. Contact Chicago TI Users Group, P.O. Box 578341, Chicago, IL 60657 or (708) 869-4304.

Milwaukee TI-Faire, Nov. 3. Contact Gene Hitz, Milwaukee Area 99/4A Users Group, 4122 North Glenway, Wauwatosa, WI 53222.

All Micro Show, Nov. 9, Bingley Hall, near Stafford, Staffordshire, England. TI99/4A Users Group UK to participate. Contact Stephen Shaw, 10 Alstone Rd., Stockport, Cheshire, England SK4 5AH.

1992 TI FAIRS

FEBRUARY

Fest-West, Feb. 15-16, Days Inn-Phoenix/Camelback, 502 West Camelback,Phoenix, Arizona. Contact VAST Users Group, c/o Tom Pfeffer, 116 S. Stellar Parkway, Chandler, AZ 85226; H. Knight (602) 938-5446; R. Rees, (602) 869-8145; or the VAST BBS, (602) 869-8145.

APRIL

Northeast Computer Fair, April 4, sponsored by TI99/4A User Group of the Boston Computer Society. Contact Ron Williams, 14 East St., Avon, MA 02322.

MAY

TI99/4A Users Group, UK, Annual Meeting, May 16, Princess Anne Training Centre, 10 Trinity St., Derby (Derbyshire, England). Contact Stephen Shaw, 10 Alstone Rd., Stockport, Cheshire England SK4 5H.

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.

User Notes

(Continued from Page 37)

and it will provide year to date statistics for;

TOTAL MILES DRIVEN:
TOTAL GALS. OF GAS:
AVG. COST PER/GAL.$
TOTAL COST OF FUEL$
MILES PER GALLON :

When entering the vehicle name you may use the entire name or only a part of it. The new "contained in" ($) feature that is found in V3.0 allows partial strings to be located in complete strings. So you could enter DODGE instead of DODGE CARAVAN and you would get the same results. Similarly, you could also enter CARAVAN and MPG would find the correct data. If you had other data in the GAS data base for your DODGE TRUCK, then using only DODGE would not isolate the CARAVAN records. Instead, it would tell you what all of your DODGE vehicles are doing in the fuel consumption area.

```
* mpg
SET TALK OFF
CLEAR
SET RECNUM OFF
SET HEADING OFF
LOCAL WV C 20
LOCAL SUMM N 9 2
LOCAL SUMG N 9 2
LOCAL SUMC N 9 2
LOCAL SUMD N 9 2
LOCAL TOT N 9 2
LOCAL MPG N 5 1
LOCAL ENTER C 1
USE GAS
SET INVERSE ON
WRITE 02,08 * VEHICLE FUEL STATISTI;
CS *
SET INVERSE OFF
WRITE 06,02 "WHICH VEHICLE?:"
READSTRING 06,18 WV
WRITE 10,02 "WORKING..."
SUM MILESDRIVN TO SUMM ;FOR (WV $ V;
EH)
SUM GALLONSGAS TO SUMG ;FOR (WV $ V;
EH)
AVERAGE COSTPERGAL TO SUMC ;FOR (WV;
$ VEH)
SUM TOTALCOST TO SUMD ;FOR (WV $ VE;
H)
REPLACE MPG WITH SUMM/SUMG
WRITE 10,02 "VEHICLE:              " WV
WRITE 12,02 "TOTAL MILES DRIVEN:" SUMM
WRITE 13,02 "TOTAL GALS. OF GAS:" SUMG
WRITE 14,02 "AVG. COST PER/GAL.$" SUMC
WRITE 15,02 "TOTAL COST OF FUEL$" SUMD
WRITE 16,02 "MILES PER GALLON  :" MPG
WRITE 22,02 "ENTER TO EXIT, P TO PR;
INT:"
READCHAR 22,28 ENTER
IF ENTER="P"
SNAP
ENDIF
CLEAR
CLOSE
RETURN
```

Quiet, please

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

I couldn't stand them any longer. They rattled, they clattered, they clunked. It sure was time to quiet the disk drives down.

To do this I oil the bars that the head mechanism slides on with normal motor oil. To get at the slides, it is usually necessary to remove the circuit board first. Just a drop or two on each slide and move the head mechanism carefully back and forth a couple of times. After that I couldn't believe the difference. I had to look at the red pilot light to see when they were really working. Well, almost!

Readers who undertake this fix do so at their own risk.

Help for parallel printer problem

This item, by Albert Anderson, of the Hunter Valleys 99ers (Australia), appeared in TI*MES, the newsletter of the TI99/4A User's Group of the United Kingdom.

Patient: TI RS232 card (PEB type)
Symptoms: RS232 operations function normally but PIO will not output correct characters to printer when called on to do so. Example:
PIM TEQT, 1014545890=QUEP-TYUIMP-AQD
instead of:
PIO TEST. 1234567890=QWER-TYUIOP/ASD

This particular case would not return a carriage return and therefore would not line feed the printer.

Cure: Removal of the suspect 74LS245 bidirectional buffer designated U3 on the RS232 card and replacement (optionally in a socket) with a brand new specimen. Cost was approximately $2.50 and the usual disclaimers on risking the health of your equipment apply — whater you do is at your own risk.

Results: Success! My PIO port now communicates with my trusty printer in a dialect that I can now interpret.

UK TI users to be at micro show

The TI99/4A Users Group of the United Kingdom will be represented at the fifth All Micro Show (formerly the Alternative Micro Show) scheduled from 10 a.m. to 4 p.m., Nov. 9, at Bingley Hall, near Stafford (Staffordshire, England). A free courtesy bus will be available from Stafford Railway Station.

Other micros at the show include Amstrad, Sinclair, Einstein, Oric, Dragon, Atari 8-bit, Commodore, SAM, IBM, Amiga and ST. There will also be a radio rally and electronic bring and buy sale. The entrance fee is two pounds.

Extended BASIC programming tips

Here are some programming tips by Bil' Sponchia.

• To get true random numbers, install this line into your program: CALL PEEK(-31880,A,B):: CALL INIT::CALL LOAD(-31808,A,B)

• To erase the program from memory but not erase the screen (and not disturb any assembly routines in lower memory): CALL INIT::CALL LOAD(-31952,255,231,255,231)

• The manual tells you that there are 16 different character sets that you can redefine and change colors on. Actually there are 17 — Set #0 is never mentioned.

• The IMAGE statement (100 IMAGE ###.##) can be used with the DISPLAY AT statement using the following format: DISPLAY AT(5,12):USING 100:A

• Did you know you can delete a file when you close it? The statement is: CLOSE #1:DELETE

MICROpendium pays $10 for items submitted by readers for publication in User Notes. If you have a tip or idea, routine or other information that may be of interest to other readers, send it to MICROpendium User Notes, P.O. Box 1343, Round Rock, TX 78680.

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