Covering the TI99/4A and the Myarc 9640

MICROpendium

Volume 8 Number 9 October 1991 $2.50

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Lotto Games and Parimutuel Betting — Page 12

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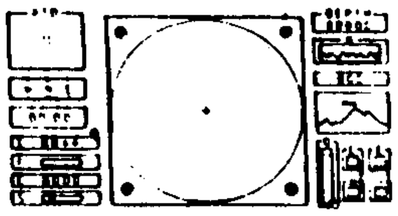

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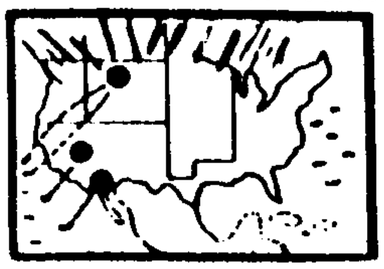

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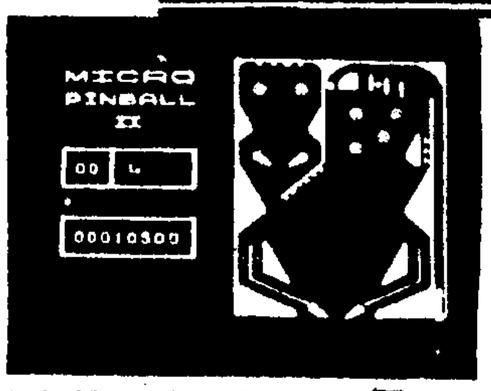

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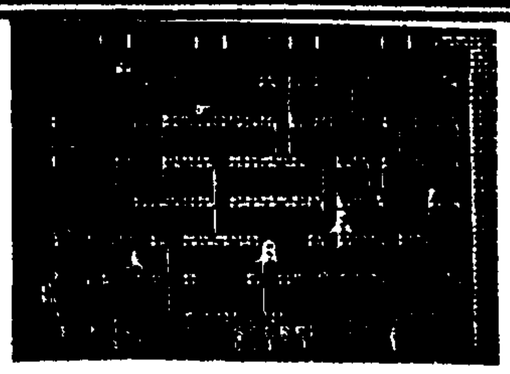

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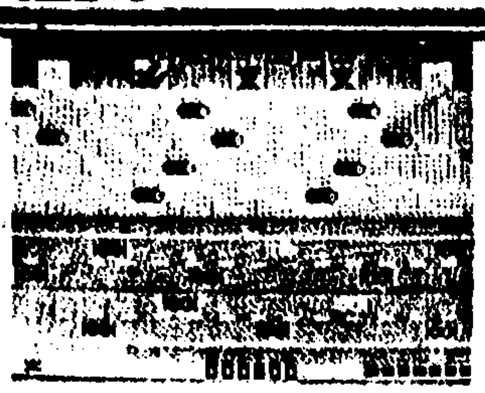

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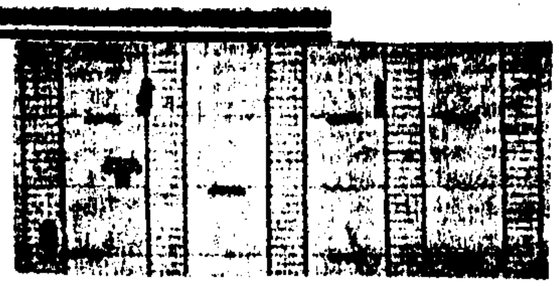

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*READ THIS

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.

TI INTERNATIONAL WORLD FAIRE WEEKEND

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(708) 437-6010

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****

SOCIAL MIXER: Friday, November 1, 1991
8:00 PM - Midnight Admission $5.00

DINNER: Saturday, November 2, 1991
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(Tell Hotel the "tracking code" is I.W.F.)

Feedback

Letters surprising

I found the letters in Feedback of August 1991 surprising.

It has been well-known to Delphi's TI-Net users that JP Software has not filled any orders by mail for approximately a year and a half. Recently, Jerry Coffey (TI-Net librarian) has entered into an agreement with JP Software to distribute some or all of JP Software's titles. Jerry will make a public announcement on TI-Net as soon as he receives the masters. He will specify exactly which titles will be available, the address to send to, etc., shortly.

The phone number for the Miami Users BBS is (305) 386-8295. TI BBS phone numbers are also available on TI-Net. They are updated and uploaded here by Mike McGaughey. Mike does a great job with this and we owe him a *big* thanks.

Oasis Pensive Abacutors of Toronto, Canada, produces a wonderful 80-column card that is *not* vaporware! I own one and love it. They have other hardware and software products available, too. The US distributor for OPA products is Bud Mills Services, 166 Dartmouth Dr., Toledo, OH 43614-2911. Their phone number is (419) 385-5946.

Shirley Slicer
Olathe, Kansas

Mailbox data transfer problems in Germany

In Germany, we have two problems transferring data with mailboxes.

First are the typical German letters, called "Umlaute." Most mailboxes use the full IBM character set. All programs for our TI99 use only characters till 127, so our letters are not visible on screen.

The second problem is compressed files in mailboxes, naturally text files. These are compressed in .zip .lzh -format. We can download them, but we have no program for TI to decompress these text files or information about the system by which they are compressed. Programs for IBM and Atari are available. Why not for TI99?

Hans Huben
Herrenberg, Germany

Reader presents list of wishes for TI99/4A

Much has been said about the new capabilities of the new accelerator for the TI99/4A. I would like to make a few suggestions with the following "Give Me" statements or requests that could help save the TI99/4A from extinction and if the price is right create a demand that brings them out of the closet.

1. **Give Me:** IBM capability with ability to add 1+ Meg RAM.

2. **Give Me:** A scanner so I can copy my own pictures and use TI programs.

3. **Give Me:** The capability to Run IBM Pascal and higher languages without using the TI card.

4. **Give Me:** The capability to us an analog-to-digital converter interface. The ADCs designed for IBM may work if we get MS-DOS on the TI99/4A. *Tell me* how to use them.

5. **Give Me:** A hookup for a FAX machine to the TI99/4A.

Cost is a big factor. If we can keep cost low enough and make a profit, the TI99/4A can be competitive with the better machines on the market and offer more flexibility than the low-end "IBM" type computers.

Also — TI software is very reasonable and *extremely* competitive in today's market — it may be even more so with the ability to go back and forth to "IBM" mode.

Finally — **Give Me** the ability to write music, *including words* — both soprano and bass cleffs with up to five notes on each staff. Expanded capabilities of the Midi interface coupled with "word/graphics" processing would save tremendous time in writing music.

We have made great strides — we must not stop!

Lewis Turner
Walkersville, Maryland

Reader seeks info

First off, I'm going to thank you for an excellent publication. You're like a life preserver thrown to us TIers in a sea of IBM, Macs etc. Keep up the good work! Since I've been out of touch with the TI world for almost two years now, I have sor questions I hope you, or someone, has the answers to.

You published a letter from Sam Carey (August 1991) in which he spoke about using Funnelweb and "some sort of assembly language cartridge dump program" to dump the program on a cartridge to a disk. Can you give me a name and where to get one of these programs? I've heard of the "GRAM Kracker," but I thought It included a piece of hardware. Incidentally, is the GRAM Kracker being sold any longer?

Another question: Is there a current listing of (most/all) TI hardware and software vendors? I'm interested in an 80-column card and a hard drive. I was wondering if someone could tell me the advantages/disadvantages between an actual hard disk vs. a RAM disk. Also, is the TI (original) monitor capable of 80 columns?

One more thing: around '86 or '87, I bought a copy of the International Users Group disk library when the group folded. The set, 80 SS/SD disks total, I think, didn't come with a catalog description list of their library. Since the filenames are th catalog numbers, it's hard to know what the programs are without having to load and run each one. I have an old list from the early '80s; it contains about 70 percent of the files. That still leaves me with about 500 files without descriptions. I was wondering if anyone might have a little more current listing I could purchase a copy of?

Andi Wise
Salem, Oregon

There are several programs to dump a cartridge to disk, including DUMPIT, which is available thorugh Tex-Comp (No. 3 in its listings of Freeware on Page 20 of this edition), but you can't load the files from the disk without a GRAM Kracker, P-GRAM card or similar GRAM device. A GRAM-Kracker plugs into the cartridge port. Among other things, it allows you to plug a cartridge into it and save the cartridge program to a disk and later reload it into GRAM Kracker. It is no longer produced, though P-GRAM, which is a card that fits into the Peripheral Expansion Box and works in a similar manner, is

(See Page 33)

BASIC

Learning to read a flight schedule

By REGENA

It seems that I have been travelling quite a bit during this summer. On my return trip from Washington, D.C., we stopped in Phoenix for an hour or so, and I was able to get a flight schedule. The program this month illustrates parts of the flight schedule and helps you learn to read and understand the schedule.

I chose flights going to Phoenix, Arizona, because Phoenix is the site for the 1992 Fest-West (Feb. 15-16). Those who have attended Fest-West in the past years are looking forward to going to another host city. If you have not attended users group meetings, now is the time to start. Valuable information and friendships are in abundance at conventions.

Phoenix will be a great place to visit in February — take a weekend off from snow skiing to enjoy Arizona weather. A couple of years ago we were driving through Arizona with a stop in Phoenix. My daughter really wanted to find a mall, so we handed her a map and told her to find one in Phoenix near the Interstate heading north to home. Well, she found one — the largest one in the Southwest, the Metrocenter, and it was impressive. She's already saving her money for a return trip during Fest-West.

Phoenix Sky Harbor International Airport is a major hub for flights, and this program covers only six cities flying into Phoenix. I chose cities which may have TI owners who will attend Fest-West, but didn't have enough computer memory to include many more cities. I included only flights arriving in Phoenix. You'll have to look at your own schedule to depart after Fest-West.

A key to using the schedule is printed at the beginning of the program (three screens of information). At any time during the quiz, you may see these instruction screens again by pressing H for Help. After the name of the city is the time zone, then the number of air miles between that city and Phoenix.

Each line of the schedule includes the departure time (local time), the arrival time in Phoenix (local time), the name of the airline and flight number with connecting number if needed, the number of stops or the connecting city, and the frequendy of the flight.

The times have A, P or N to indicate a.m., p.m. or noon. The connecting city uses the three-letter standard designation. A key to the cities is listed in the Help screen. The frequency may be D for Daily, X6 for Except Saturday, X7 for Except Sunday or X67 for Except Saturday and Sunday.

The data used in this program are from an actual flight schedule, but keep in mind that schedules and flights change, so the times and numbers may not be the same in February. These are for examples only.

To try to fit a lot of information on one line, several characters were redefined. The hour numbers and colons are combined to be one character width. The three-letter city designations are defined in two characters. The time designations A, P and N were redefined so a space was not used after the letter.

The program is mostly PRINT statements with branching. Subroutines are used to print the schedules for the cities and the Help screens. Lines 3950-4150 contain the Help screens. Lines 4160-4200 are the subroutine to wait for the user to press any key before continuing. Lines 4210-4390 are the subroutine to ask how many flights leave a city, and Lines 4400-4580 are the subroutine to ask how many different airlines leave a city.

Remember to use CALL FILES(1), NEW to allow this nearly full-memory program to run.

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.* Be sure to specify that you need "Flight Schedule" for the TI and whether you want cassette or diskette.

FLIGHT SCHEDULE

```
100 REM FLIGHT SCHEDULE !005
110 CALL CLEAR !209
120 PRINT TAB(4);"PHOENIX SK
Y HARBOR": :"  INTERNATIONAL
 AIRPORT" !064
130 FOR K=97 TO 126 !228
140 READ C$ !254
150 CALL CHAR(K,C$)!089
160 NEXT K !225
170 DATA 0000609090F0909,000
0E09090E0808,006494828282916
1,004C52909692120C,00040D040
4050404,001825040409103C !07
8
180 DATA 001C250418052418,00
040D14243D0404,003C213804052
418,001821202C352418,003C050
80811101,0018252418252418 !0
73
190 DATA 001825241C050418,00
98A5A4A4A5A498,0090919090919
09,0098A584848990BC,00639292
93929262 !055
200 DATA 008E49498949494E,00
E79191919191E1,00D1111515150
A0A,00E29292E2828282,007C101
01010101,00E39292939292E2 !0
04
210 DATA 00D1111595150A0A,00
88895222538A89,008F0102C2242
4C4,0089885020508888,00E0204
04080808,00800000C02020C !12
8
220 DATA 000088C8A8A89888 !2
33
230 GOSUB 3950 !205
240 CALL CLEAR !209
250 PRINT : : :"CHOOSE CITY:
": :!076
260 RESTORE 310 !148
270 FOR K=1 TO 7 !064
280 READ A$(K),B$(K)!133
290 PRINT K;A$(K)!184
300 NEXT K !225
310 DATA "BOSTON, MA",EDT 23
00,"CHICAGO, IL (O'HARE)",CD
T 1440,"DENVER, CO",MDT  589
,"FRANKFURT, GERMANY" !021
320 DATA UTC 5637,"SALT LAKE
```

(See Page 8)

REGENA ON BASIC—

(Continued from Page 7)

```
 CITY, UT",MDT  507,"TORONTO
, OT, CANADA",EDT 1876,END P
ROGRAM,"" !205
330 CALL KEY(3,K,S)!190
340 IF (K<49)+(K>55)THEN 330
 !099
350 IF K=55 THEN 4590 !057
360 CH=K-48 !140
370 GOSUB 390 !215
380 ON CH GOTO 470,1000,1620
,2160,2680,3300 !231
390 CALL CLEAR !209
400 PRINT "FROM":A$(CH);" ";
B$(CH): :!197
410 ON CH GOSUB 430,930,1490
,2100,2550,3170 !182
420 RETURN !136
430 PRINT "j45an50aNORTHWEST
 101     1 Dk00ao04aUSAIR 369
         1 Dk37an06aAMERICA W
EST 82   0 D" !013
440 PRINT "h00bl08bNORTHWEST
 391     1 Dh55bk31bAMERICA W
EST 76   0 Di25bn40bDELTA 589
         2 D" !254
450 PRINT "151be25aAMERICA W
EST 700 1 D": :!011
460 RETURN !136
470 A=7 !255
480 GOSUB 4210 !210
490 A=4 !252
500 GOSUB 4400 !145
510 GOSUB 390 !215
520 PRINT "HOW MANY AIR MILE
S IS IT    BETWEEN BOSTON AN
D PHOENIX?": :!066
530 INPUT ANS$ !152
540 IF ANS$<>"H" THEN 570 !2
06
550 GOSUB 3950 !205
560 GOTO 510 !078
570 PRINT :"THE TOP LINE SHO
WS 2300 MI." !236
580 GOSUB 4160 !160
590 GOSUB 390 !215
600 PRINT "WHAT TIME DOES TH
E EARLIEST FLIGHT LEAVE BOST
ON?" !122
610 PRINT :"A  1:25 A.M.    C
  10:50 A.M.B  6:45 A.M.    D
   7:00 A.M." !222
620 CALL KEY(3,K,S)!190
630 IF K<>72 THEN 660 !144
640 GOSUB 3950 !205
650 GOTO 590 !159
660 IF (K<65)+(K>68)THEN 620
 !136
670 PRINT :CHR$(K)!223
680 PRINT "NORTHWEST 101 LEA
VES AT 6:45" !141
690 GOSUB 4160 !160
700 GOSUB 390 !215
710 PRINT "WHICH FLIGHT ARRI
VES NEARESTNOON HOUR?" !031
720 PRINT :"A  NORTHWEST 101
":"B  USAIR 369":"C  AMERICA
 WEST 82":"D  AMERICA WEST 7
00" !136
730 CALL KEY(3,K,S)!190
740 IF K<>72 THEN 770 !255
750 GOSUB 3950 !205
760 GOTO 700 !013
770 IF (K<65)+(K>68)THEN 730
 !246
780 PRINT :CHR$(K)!223
790 PRINT "USAIR 369 ARRIVES
 AT        11:04 A.M." !202
800 GOSUB 4160 !160
810 GOSUB 390 !215
820 PRINT "IF YOU LOVE TAKE-
OFFS, WHICHWOULD BE THE FUNN
EST FLIGHT?" !143
830 PRINT :"A  NORTHWEST 101
":"B  USAIR 369":"C  AMERICA
 WEST 76":"D  DELTA 589" !16
8
840 CALL KEY(3,K,S)!190
850 IF K<>72 THEN 880 !109
860 GOSUB 3950 !205
870 GOTO 810 !124
880 IF (K<65)+(K>68)THEN 840
 !101
890 PRINT :CHR$(K)!223
900 PRINT "DELTA 589 HAS TWO
 STOPS." !168
910 GOSUB 4160 !160
920 GOTO 240 !063
930 PRINT "g40ai27aAMERICA W
EST 111 0 Dj05ak50aAMERICA W
EST 1    0 Dl20an03aUNITED 32
1        0 {" !088
940 CALL HCHAR(23,31,124)!09
8
950 PRINT "m10an45aAMERICAN
407      0 Dm44ao18aUNITED 28
3        0 Do55ae35bAMERICAN
235      0 D" !077
960 PRINT "p30bf12bUNITED 38
1        0 De03bf47bAMERICA W
EST 6    0 Dg00bh33bAMERICAN
321      0 D" !143
970 PRINT "g40bi17bAMERICA W
EST 10   0 Dj30bl12bAMERICAN
617      0 Dj44bl22bUNITED 51
5        0 D" !177
980 PRINT "m25bn59bAMERICAN
157      0 D": :!142
990 RETURN !136
1000 A=13 !045
1010 GOSUB 4210 !210
1020 A=3 !251
1030 GOSUB 4400 !145
1040 GOSUB 390 !215
1050 PRINT "WHICH FLIGHT DOE
S NOT       OPERATE ON SUNDA
Y?" !030
1060 PRINT "A  AMERICA WEST
1":"B  UNITED 321":"C  AMERI
CAN 617":"D  ALL OPERATE SUN
DAYS" !151
1070 CALL KEY(3,K,S)!190
1080 IF K<>72 THEN 1110 !084
1090 GOSUB 3950 !205
1100 GOTO 1040 !099
1110 IF (K<65)+(K>68)THEN 10
70 !076
1120 PRINT CHR$(K)!042
1130 PRINT "X7 INDICATES UNI
TED 321 DOESNOT FLY ON SUNDA
Y." !153
1140 GOSUB 4160 !160
1150 GOSUB 390 !215
1160 PRINT "WHICH FLIGHT CHA
NGES PLANES?" !011
1170 PRINT "A  AMERICA WEST
1":"B  UNITED 281":"C  AMERI
CAN 617":"D  ALL FLIGHTS ARE
 NON-STOP" !209
1180 CALL KEY(3,K,S)!190
1190 IF K<>72 THEN 1220 !194
1200 GOSUB 3950 !205
1210 GOTO 1150 !209
1220 IF (K<65)+(K>68)THEN 11
80 !186
1230 PRINT CHR$(K)!042
1240 PRINT "ALL FLIGHTS ARE
NON-STOP." !042
1250 GOSUB 4160 !160
1260 GOSUB 390 !215
1270 PRINT "WHICH FLIGHT COU
LD ARRIVE   THE EARLIEST ON
SATURDAY?" !172
```

(See Page 9)

REGENA ON BASIC—

(Continued from Page 8)

```
1280 PRINT "A  AMERICA WEST
111":"B  AMERICA WEST 1":"C
 UNITED 321":"D  AMERICAN 40
7" !073
1290 CALL KEY(3,K,S)!190
1300 IF K<>72 THEN 1330 !049
1310 GOSUB 3950 !205
1320 GOTO 1260 !063
1330 IF (K<65)+(K>68)THEN 12
90 !041
1340 PRINT CHR$(K)!042
1350 PRINT "AMERICA WEST 111
 AT 5:27." !095
1360 GOSUB 4160 !160
1370 GOSUB 390 !215
1380 PRINT "WHICH UNITED FLI
GHT LEAVES  THE CLOSEST TO N
OON?" !103
1390 PRINT "A  321      C  3
81":"B  283      D  515" !24
7
1400 CALL KEY(3,K,S)!190
1410 IF K<>72 THEN 1440 !159
1420 GOSUB 3950 !205
1430 GOTO 1370 !174
1440 IF (K<65)+(K>68)THEN 14
00 !151
1450 PRINT CHR$(K)!042
1460 PRINT "UNITED 381 LEAVE
S AT 12:30." !230
1470 GOSUB 4160 !160
1480 GOTO 240 !063
1490 PRINT "j50ak46aAMERICA
WEST 844 0 {" !229
1500 CALL HCHAR(23,31,124)!0
98
1510 PRINT "148am39aUNITED 3
25       0 Dm08an10aCONTINEN
TAL 787  0 Do42ap37bAMERICA
WEST 83  0 D" !134
1520 PRINT "o56ap53bCONTINEN
TAL 1233 0 Dp00~p53bUNITED 4
19       0 Df45bg35bCONTINEN
TAL 201  0 D" !179
1530 PRINT "g35bh31bAMERICAW
EST 1249 0 y" !236
1540 CALL HCHAR(23,31,125)!0
99
1550 PRINT "i19bj04bUNITED 4
39       0 Di32bj29bAMERICA
WEST 98  0 Dj02bk00bCONTINEN
TAL 469  0 D" !107
1560 PRINT "129bm25bCONTINEN
TAL 467  0 y" !247
1570 CALL HCHAR(23,31,125)!0
99
1580 PRINT "140bm23bUNITED 6
95       0 D" !230
1590 PRINT "145bm40bAMERICA
WEST 40  0 y": :!053
1600 CALL HCHAR(22,31,125)!0
98
1610 RETURN !136
1620 A=14 !046
1630 GOSUB 4210 !210
1640 A=3 !251
1650 GOSUB 4400 !145
1660 GOSUB 390 !215
1670 PRINT "HOW MANY FLIGHTS
 COULD GET  YOU TO FEST-WEST
 SATURDAY   MORNING?" !182
1680 INPUT ANS$ !152
1690 IF ANS$<>"H" THEN 1720
!080
1700 GOSUB 3950 !205
1710 GOTO 1660 !209
1720 IF ANS$<>"5" THEN 1750
!091
1730 PRINT :"5 FLIGHTS LEAVE
 BEFORE NOON,BUT ONLY 3 ARRI
VE IN THE    MORNING." !173
1740 GOTO 1800 !094
1750 IF (ANS$="3")+(ANS$="TH
REE")THEN 1780 !089
1760 PRINT :"NO, ";!185
1770 GOTO 1790 !083
1780 PRINT :"YES, ";!014
1790 PRINT "3 FLIGHTS ARRIVE
 BEFORE NOON" !249
1800 GOSUB 4160 !160
1810 GOSUB 390 !215
1820 PRINT "WHAT IS THE LATE
ST TIME YOU COULD LEAVE ON S
ATURDAY?" !142
1830 PRINT "A  8:29 P.M.
C  8:45 P.M.B  8:40 P.M.
D  9:40 P.M." !110
1840 CALL KEY(3,K,S)!190
1850 IF K<>72 THEN 1880 !089
1860 GOSUB 3950 !205
1870 GOTO 1810 !104
1880 IF (K<65)+(K>68)THEN 18
40 !081
1890 PRINT :CHR$(K)!223
1900 ON K-64 GOTO 1910,1950,
1910,1930 !207
1910 PRINT "X6 INDICATES NOT
 ON SATURDAY" !028
1920 GOTO 1960 !254
1930 PRINT "ARRIVAL TIME IS
9:40 P.M." !168
1940 GOTO 1960 !254
1950 PRINT "YES." !134
1960 PRINT "8:40 IS THE LAST
 AVAILABLE  ON SATURDAYS." !
255
1970 GOSUB 4160 !160
1980 GOSUB 390 !215
1990 PRINT "WHICH UNITED FLI
GHT WOULD   ARRIVE EARLY SAT
URDAY       AFTERNOON?" !168
2000 PRINT "A  325       C
201":"B  419       D  439" !
058
2010 CALL KEY(3,K,S)!190
2020 IF K<>72 THEN 2050 !004
2030 GOSUB 3950 !205
2040 GOTO 1980 !018
2050 IF (K<65)+(K>68)THEN 20
10 !251
2060 PRINT :CHR$(K)!223
2070 PRINT "UNITED 419 ARRIV
ES DAILY AT 12:53 P.M." !210
2080 GOSUB 4160 !160
2090 GOTO 240 !063
2100 PRINT "m50ag35bDELTA 62
83*       1" !122
2110 PRINT "n25ah15bAMERICAN
 71/1441 wx" !180
2120 PRINT "o55ak19bUSAIR 81
7/45     uv" !086
2130 PRINT "e35bk35bDELTA 49
/787     cd": :!127
2140 CALL VCHAR(19,31,68,4)!
251
2150 RETURN !136
2160 A=4 !252
2170 GOSUB 4210 !210
2180 A=3 !251
2190 GOSUB 4400 !145
2200 GOSUB 390 !215
2210 PRINT "IF YOU WANT TO L
EAVE IN THE AFTERNOON, WHICH
 AIRLINE DO YOU NEED?" !172
2220 PRINT :"A  AMERICAN":"B
  DELTA":"C  UNITED":"D  USA
IR" !177
2230 CALL KEY(3,K,S)!190
2240 IF (K<>72)THEN 2270 !07
7
2250 GOSUB 3950 !205
2260 GOTO 2200 !239
```

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```
2270 IF (K<65)+(K>68)THEN 22
30 !216
2280 PRINT :CHR$(K)!223
2290 PRINT "DELTA LEAVES AFT
ER NOON." !223
2300 GOSUB 4160 !160
2310 GOSUB 390 !215
2320 PRINT :"IF YOU WOULD LI
KE TO SEE    TEXAS ON YOUR W
AY, WHICH    AIRLINE WOULD Y
OU CHOOSE?" !050
2330 PRINT :"A  AMERICAN":"B
  DELTA":"C  USAIR":"D  SOUT
HWEST" !193
2340 CALL KEY(3,K,S)!190
2350 IF K<>72 THEN 2380 !079
2360 GOSUB 3950 !205
2370 GOTO 2310 !094
2380 IF (K<65)+(K>68)THEN 23
40 !071
2390 PRINT :CHR$(K)!223
2400 PRINT "AMERICAN AIRLINE
S FLIGHT 71 STOPS AT DALLAS/
FORT WORTH  AIRPORT ON THE W
AY TO       PHOENIX." !085
2410 GOSUB 4160 !160
2420 GOSUB 390 !215
2430 PRINT "IF YOU FLY DELTA
 AND ARRIVE IN PHOENIX FOR F
EST-WEST ON FRIDAY EVENING,
WHAT FLIGHT" !180
2440 PRINT "NUMBER SHOULD TH
E GREETING  COMMITTEE WATCH
FOR?" !133
2450 PRINT :"A  6283":"B  49
":"C  45":"D  787" !252
2460 CALL KEY(3,K,S)!190
2470 IF K<>72 THEN 2500 !199
2480 GOSUB 3950 !205
2490 GOTO 2420 !204
2500 IF (K<65)+(K>68)THEN 24
60 !191
2510 PRINT :CHR$(K)!223
2520 PRINT "DELTA 787" !156
2530 GOSUB 4160 !160
2540 GOTO 240 !063
2550 PRINT "k15ak49aAMERICA
WEST 550 0 {" !228
2560 CALL HCHAR(23,31,124)!0
98
2570 PRINT "m25am55aDELTA 25
4        0 D" !165
2580 PRINT "n46ao19aAMERICAW
EST 1280 0 D" !198
2590 PRINT "n55ao25aDELTA 58
8        0 D" !178
2600 PRINT "p39be10bDELTA 16
17       0 D" !178
2610 PRINT "h20bh55bDELTA 14
98       0 D" !179
2620 PRINT "i40bj14bAMERICA
WEST 33  0 D" !142
2630 PRINT "k55bl30bDELTA 16
11       0 D" !174
2640 PRINT "m21bm50bDELTA 18
55       0 D" !182
2650 PRINT "n05bp05aAMERICA
WEST 312 1 y": :!073
2660 CALL HCHAR(22,31,125)!0
98
2670 RETURN !136
2680 A=10 !042
2690 GOSUB 4210 !210
2700 A=2 !250
2710 GOSUB 4400 !145
2720 GOSUB 390 !215
2730 PRINT "TO ARRIVE IN PHO
ENIX IN THE EARLY AFTERNOON,
 WHICH      FLIGHT IS BEST?"
 !207
2740 PRINT :"A  AMERICA WEST
 550":"B  DELTA 588":"C  DEL
TA 1617":"D  DELTA 1611" !18
5
2750 CALL KEY(3,K,S)!190
2760 IF K<>72 THEN 2790 !234
2770 GOSUB 3950 !205
2780 GOTO 2720 !249
2790 IF (K<65)+(K>68)THEN 27
50 !226
2800 PRINT :CHR$(K)!223
2810 PRINT "DELTA 1617 ARRIV
ES AT 1:10." !226
2820 GOSUB 4160 !160
2830 GOSUB 390 !215
2840 PRINT "WHICH AMERICA WE
ST FLIGHT   ARRIVES ON SUNDA
Y MORNING?" !005
2850 PRINT :"A   550     C
 33":"B  1280     D  312" !1
63
2860 CALL KEY(3,K,S)!190
2870 IF K<>72 THEN 2900 !089
2880 GOSUB 3950 !205
2890 GOTO 2830 !104
2900 IF (K<65)+(K>68)THEN 28
60 !081
2910 PRINT :CHR$(K)!223
2920 PRINT "1280 IS THE ONL
 FLIGHT FOR AMERICA WEST ARR
IVING ON    SUNDAY MORNING."
 !233
2930 GOSUB 4160 !160
2940 GOSUB 390 !215
2950 PRINT "TO LEAVE SATURDA
Y AS EARLY  AS POSSIBLE FOR
FEST-WEST,  WHICH FLIGHT IS
BEST?" !226
2960 PRINT "A  AMERICA WEST
550":"B  DELTA 254":"C  AMER
ICA WEST 1280":"D  DELTA 185
5" !242
2970 CALL KEY(3,K,S)!190
2980 IF K<>72 THEN 3010 !199
2990 GOSUB 3950 !205
3000 GOTO 2940 !214
3010 IF (K<65)+(K>68)THEN 29
70 !191
3020 PRINT :CHR$(K)!223
3030 PRINT "AMERICA WEST 550
 LEAVES     SALT LAKE CITY A
T 7:15 A.M." !169
3040 GOSUB 4160 !160
3050 GOSUB 390 !215
3060 PRINT "WHAT TIME DOES T
HE EARLIEST DELTA FLIGHT ARR
IVE IN      PHOENIX?" !013
3070 PRINT :"A  7:15 A.M.
C  9:25 A.M. B  7:49 A.M.
D  9:55 A.M." !205
3080 CALL KEY(3,K,S)!190
3090 IF K<>72 THEN 3120 !054
3100 GOSUB 3950 !205
3110 GOTO 3050 !068
3120 IF (K<65)+(K>68)THEN 30
80 !046
3130 PRINT :CHR$(K)!223
3140 PRINT "DELTA 254 ARRIVE
S AT 9:55   IN THE MORNING."
 !001
3150 GOSUB 4160 !160
3160 GOTO 240 !063
3170 PRINT "j30am45aDELTA 30
71/379   cd" !049
3180 PRINT "k10an45aAMERICAN
 181/407 qr" !170
3190 PRINT "120ao18aUNITED 6
69/283   qr" !131
3200 PRINT "n10ae30bNORTHWES
T 411/249st" !017
3210 PRINT "n15ae35bAMERICAN
```

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```
 1285/235qr" !190
3220 PRINT "o05af12bUNITED 7
97/381   qr" !124
3230 PRINT "e21bh33bAMERICAN
 1317/321qr" !172
3240 PRINT "g45bk35bDELTA 30
07/787   cd" !053
3250 PRINT "i24bl22bUNITED 4
87/515   qr" !122
3260 PRINT "k35bn37bNORTHWES
T 1197/25st" !042
3270 PRINT "100bn59bAMERICAN
 457/157 qr": :!035
3280 CALL VCHAR(12,31,68,11)
!035
3290 RETURN !136
3300 A=11 !043
3310 GOSUB 4210 !210
3320 A=4 !252
3330 GOSUB 4400 !145
3340 GOSUB 390 !215
3350 PRINT "HOW MAY FLIGHTS
GO THROUGH  CHICAGO ON THE W
AY?" !235
3360 INPUT ANS$ !152
3370 IF ANS$<>"H" THEN 3400
!231
3380 GOSUB 3950 !205
3390 GOTO 3340 !104
3400 PRINT "7 FLIGHTS LIST O
RD (CHICAGO)AS THE CONNECTIN
G CITY." !226
3410 GOSUB 4160 !160
3420 GOSUB 390 !215
3430 PRINT "WHAT CONNECTING
CITY DOES   NORTHWEST USE?"
!231
3440 INPUT ANS$ !152
3450 IF ANS$<>"H" THEN 3480
!055
3460 GOSUB 3950 !205
3470 GOTO 3420 !184
3480 PRINT :"DTW STANDS FOR
DETROIT." !123
3490 GOSUB 4160 !160
3500 GOSUB 390 !215
3510 PRINT "WHAT DELTA FLIGH
T DEPARTS   FROM TORONTO ON
FRIDAY      AFTERNOON?" !164
3520 PRINT :"A  3071     C
1317":"B  3007     D  787" !
010
3530 CALL KEY(3,K,S)!190
3540 IF K<>72 THEN 3570 !249
3550 GOSUB 3950 !205
3560 GOTO 3500 !008
3570 IF (K<65)+(K>68)THEN 35
30 !241
3580 PRINT :CHR$(K)!223
3590 PRINT "DELTA 3007 DEPAR
TS AT 3:45." !222
3600 GOSUB 4160 !160
3610 GOSUB 390 !215
3620 PRINT "WHAT TIME WOULD
AMERICAN 407ARRIVE IN PHOENI
X SATURDAY?" !106
3630 PRINT :"A  7:10 A.M.
C  10:59 P.M.B 10:45 A.M.
D  NO FLIGHT" !128
3640 CALL KEY(3,K,S)!190
3650 IF K<>72 THEN 3680 !104
3660 GOSUB 3950 !205
3670 GOTO 3610 !119
3680 IF (K<65)+(K>68)THEN 36
40 !096
3690 PRINT :CHR$(K)!223
3700 PRINT "ARRIVAL TIME IS
10:45 A.M." !199
3710 GOSUB 4160 !160
3720 GOSUB 390 !215
3730 PRINT "WHAT IS THE LATE
ST UNITED  FLIGHT LEAVING O
N FRIDAY?" !126
3740 PRINT :"A  487      C
 515":"B  524      D  457"
!253
3750 CALL KEY(3,K,S)!190
3760 IF K<>72 THEN 3790 !214
3770 GOSUB 3950 !205
3780 GOTO 3720 !229
3790 IF (K<65)+(K>68)THEN 37
50 !206
3800 PRINT :CHR$(K)!223
3810 PRINT "UNITED 487 LEAVE
S AT 5:24" !146
3820 GOSUB 4160 !160
3830 GOSUB 390 !215
3840 PRINT "WHICH FLIGHT DO
YOU TAKE TO SEE CINCINNATI S
ATURDAY     MORNING?" !079
3850 PRINT "A  DELTA 3071":"
B  AMERICAN 181":"C  NORTHWE
ST 411":"D  NOT FROM TORONTO
" !141
3860 CALL KEY(3,K,S)!190
3870 IF K<>72 THEN 3900 !069
3880 GOSUB 3950 !205
3890 GOTO 3830 !083
3900 IF (K<65)+(K>68)THEN 38
60 !061
3910 PRINT CHR$(K)!042
3920 PRINT "DELTA 3071 STOPS
 AT CVG." !108
3930 GOSUB 4160 !160
3940 GOTO 240 !063
3950 PRINT : :"HOW TO USE TH
IS SCHEDULE" !104
3960 PRINT :"EXAMPLE:":"FROM
 MIAMI, FL  EDT 1972":"CITY,
 TIME ZONE, AIR MILES" !017
3970 PRINT : :"EACH LINE SHO
WS:" !036
3980 PRINT "  DEPARTURE TIME
 (LOCAL)":"  ARRIVAL TIME (L
OCAL)" !160
3990 PRINT "  AIRLINE":"  FL
IGHT NUMBER/CONNECTING":"  S
TOPS/VIA":"  FREQUENCY" !044
4000 PRINT :"ONE FLIGHT NUMB
ER INDICATES    SAME PLANE S
ERVICE" !013
4010 PRINT "TWO FLIGHT NUMBE
RS INDICATE    CONNECTING SE
RVICE" !162
4020 PRINT "* INDICATES PLAN
E CHANGE      ENROUTE" !191
4030 GOSUB 4160 !160
4040 PRINT "STOPS/VIA CODE"
!084
4050 PRINT :"0 - NON-STOP":"
1 - 1 STOP, NO PLANE CHANGE"
:"2 - 2 STOPS, NO PLANE CHAN
GE" !139
4060 PRINT : :"FREQUENCY COD
E" !200
4070 PRINT :"X EXCEPT";TAB(1
5);"5 FRIDAY":"1 MONDAY";TAB
(15);"6 SATURDAY" !119
4080 PRINT "2 TUESDAY";TAB(1
5);"7 SUNDAY":"3 WEDNESDAY";
TAB(15);"D DAILY":"4 THURSDA
Y": :!180
4090 GOSUB 4160 !160
4100 PRINT "CONNECTING CITY
CODE": : :!018
4110 PRINT "ATL ATLANTA":"BW
I BALTIMORE":"CLT CHARLOTTE"
:"CVG CINCINNATI":"DEN DENVE
R" !123
4120 PRINT "DFW DALLAS/FT. W
ORTH":"DTW DETROIT":"IAH HOU
STON":"IND INDIANAPOLIS":"JF
```

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```
K KENNEDY" !192
4130 PRINT "LAX LOS ANGELES"
:"ORD CHICAGO O'HARE":"PIT P
ITTSBURG":"SEA SEATTLE":"SLC
 SALT LAKE CITY" !001
4140 GOSUB 4160 !160
4150 RETURN !136
4160 PRINT :"PRESS ANY KEY T
O CONTINUE";!203
4170 CALL KEY(3,K,S)!190
4180 IF S<1 THEN 4170 !099
4190 CALL CLEAR !209
4200 RETURN !136
4210 FLAG=0'!209
4220 PRINT "HOW MANY FLIGHTS
 ARE THERE  FROM ";A$(CH);"
TO PHOENIX?": :!091
4230 INPUT ANS$ !152
4240 IF ANS$="" THEN 4310 !1
10
4250 IF ANS$<>"H" THEN 4290
!100
4260 GOSUB 3950 !205
4270 GOSUB 390 !215
4280 GOTO 4220 !219
4290 IF (ASC(ANS$)<48)+(ASC(
ANS$)>57)THEN 4310 !007
4300 IF VAL(ANS$)=A THEN 436
0 !098
4310 FLAG=FLAG+1 !173
4320 IF FLAG=2 THEN 4370 !24
3
4330 PRINT "TRY AGAIN": :!08
5
4340 GOSUB 400 !225
4350 GOTO 4220 !219
4360 PRINT "YES, " !165
4370 PRINT "THERE ARE";A;"FL
IGHTS." !147
4380 GOSUB 4160 !160
4390 RETURN !136
4400 FLAG=0 !209
4410 GOSUB 390 !215
4420 PRINT "HOW MANY DIFFERE
NT AIRLINES ARE THERE FLYING
 FROM ";A$(CH);" TO PHOENIX?
": :!050
4430 INPUT ANS$ !152
4440 IF ANS$="" THEN 4500 !0
45
4450 IF ANS$<>"H" THEN 4480
!035
4460 GOSUB 3950 !205
4470 GOTO 4410 !154
4480 IF (ASC(ANS$)<48)+(ASC(
ANS$)>57)THEN 4500 !198
4490 IF VAL(ANS$)=A THEN 455
0 !032
4500 FLAG=FLAG+1 !173
4510 IF FLAG=2 THEN 4560 !17
7
4520 PRINT "NO, TRY AGAIN":
:!066
4530 GOSUB 400 !225
4540 GOTO 4420 !164
4550 PRINT "YES," !132
4560 PRINT "THERE ARE";A;"DI
FFERENT":"AIRLINES." !246
4570 GOSUB 4160 !160
4580 RETURN !136
4590 CALL CLEAR !209
4600 END !139
```

EXTENDED BASIC

Lotto games and pari-mutuel gambling

By JERRY STERN
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A numbers game is very simple. The probabilities for last month's NUMBERS program for analyzing lottery games could have been calculated without a calculator, and only the job of adding them up with their matching payoffs made the TI99/4A necessary. Lotto games are far more complex. Instead of one number chosen between 0 and 999, there are six or more numbers chosen from a much smaller range of numbers. There are no fixed prizes, except maybe a few dollars for matching one-half of the numbers drawn.

Most prizes are shared equally among the winners, and if no one guesses the winning numbers, the prize pool is carried over to the next drawing. The odds are different — in a three-digit numbers game, there is a one in 1,000 chance of having the right number for the largest prize. Lotto odds may be 14 million to one that the ticket clutched in a gambler's hot hand will be ice cold. These odds are difficult to calculate, but they make an excellent review of probability theory. This month's program, LOTTO, calculates those odds, but first, you'll need a few definitions.

First, pari-mutuel gambling is the term that describes how these lotto games are run. If only one gambler guesses the numbers correctly, he or she will win the entire jackpot. If twenty gamblers guess correctly, they each share the same amount of money. This method of gambling is risk-free only for the lottery commission — they always pay out the same amount of cash.

The probability of winning a Lotto game, where each possible combination of numbers is equally likely, is equal to the number of possible winning tickets, divided by the number of possible tickets, both winning and losing. The odds of any bet is equal to one divided by the probability of that bet. Odds and probability are just two looks at the same number. We use both because odds are easier to visualize, such as "a 1 in 3 chance of rain tonight," but probabilities can be added together easily, such as "he has a fifty percent chance of being shot, and an equal chance of escape." LOTTO displays odds, but some of the calculations are done with probabilities.

The expectation of a bet is the average amount won on that bet for all the tickets sold. If one million gamblers invest two million dollars in lotto tickets, and win one

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million dollars in prizes to about 20,000 people, the expectation of that bet is fifty cents. Because the total winnings amount is not usually available, and because you should know the numbers before the bet rather than later, LOTTO will calculate the expectation for lotto games.

If there are five books in a box, how many ways can I pull them out, one at a time? If you rattled off 120 or five factorial, go on to the next paragraph. Five factorial is equal to 5 * 4 * 3 * 2 * 1. There are five possible choices for the first book, multiplied by four choices for the second book, and so on until the box is empty. The formulas we'll need to calculate the odds for a lotto game use factorials.

Factorial numbers get very large. Most scientific calculators can handle up to 69 factorial, written as 69!, which roughly equals 1.711224523 E 98, (times 10 to the 98th power). The TI 99/4A can handle slightly larger numbers, up to 84!, which is about 3.31424 E 126. The Pennsylvania Super 7 Lotto Game, which is not necessarily a typical lotto game, is the most complex game I've seen, so I'll use it as an example for LOTTO. It includes numbers chosen from a pool of 79 numbers. That one number already tells us that a calculator cannot handle the job, and the TI 99/4A will be working near its upper limits. The numbers are just too big. So let's cheat. We'll calculate the factorials we need as logarithms.

A logarithm (remember Algebra II?) is the number that we must raise 10 to in order to get that number. So, the log of 100 is 2, the log of 1000 is 3, and the log of 84! is 126.520384. If we add the logs of two numbers, the result is equal to the multiplication of the original numbers. That means that

log 10 + log 100 = log 1000

1 + 2 = 3.

To calculate our factorials of large numbers, we'll just add up the logs of their factors, log 1 + log 2 + log 3+ ... + log 84.

Just one more definition, and we can get back to TI Extended BASIC. A combination is a number that describes how many different ways we can combine objects out of a group. For the five books in a box example, the combination of five books, while choosing only two books out of the box, where order doesn't matter, is 5 choices for the first book times 4 choices for the second, divided by the number of duplications of choices with different orders. OR: it is:

5!

(5-2)! * 2!

Using the formula for combinations, we can calculate how many different lotto tickets there could be. For the Pennsylvania Lotto, gamblers choose 7 numbers from 1 to 79:

79!

(79-7)! * 7!

There are 2,898,753,715 possible lotto tickets for this game, all different. If Pennsylvania used a simple Lotto, only one of these could be a winner in each drawing, and one winner in each group of nearly three billion could win. But Pennsylvania chooses 10 random numbers in their drawing, and the gambler's ticket can match any seven of those ten.

```
Pennsylvania Super 7 Lotto

Games on a $    1.00 ticket:1

Match       Odds          Returns

Pick   7 14996492      $   .0934
       1 Win $    1400000 Each
Pick   4 205           $   .0729
   19448 Win $          15 Each
Pick   6 133897        $   .0193
      30 Win $       2580 Each
Pick   5 3542          $   .0578
    1130 Win $        205 Each
```

Screen print from LOTTO

I'll leave it to LOTTO to calculate the odds for Pennsylvania's game. No matter how complex the lotto game, the basic principle remains that the probability of winning any bet is equal to the number of possible ways to win that bet, divided by the total number of ways that the chosen gambling gadget can fall, roll, spin, or plop. The combinations and factorials are just tools to calculate how many different ways those events can occur.

That's enough math for now — about enough for a week's classes in freshman probability. Let's turn to LOTTO. First, change the printer name in line 90 to suit your printer, and if you wish, add some printer codes for bold or large print in a PRINT statement at the end of line 31205 in the DUMP subprogram. Run the program. The menu allows four choices. You may calculate the value of an annuity prize, just like in NUMBERS last month. Option 4 ends the program, and option 3 is a quick reference to how to enter numbers into LOTTO.

Like NUMBERS again, the best way to run LOTTO is with the lottery brochure open in front of you. If you don't have a brochure for your state's lotto game, try Pennsylvania.

Pennsylvania Super 7 Lotto

Match 7 out of 10 numbers chosen from 79.

Minimum Jackpot-$2 million.

One game per $1. ticket.

Match 7-share 70% of the pool.

Match 4-win $15.

Match 5-share 7% of the remaining pool after the first and last prizes.

Match 6-share 25% of the remaining pool after the first and last prizes.

The lotto brochures usually show the odds for each bet, too, but LOTTO calculates these on its own, so you won't need to enter them. Choose option 1 for lotto analysis. Enter the name of the game, the cost of a ticket, and how many sets of game numbers are on a ticket. Next, enter how many numbers the lotto machine will choose from, how many will be chosen by the lotto machine, and how many will be picked by the gambler: 79, 10, and 7 in Pennsylvania. Next, enter the amount of the winning prize pool.

The next number, how many tickets were sold for the drawing, may not always be available. The number of tickets affects how many winners there will be, and so how big a share of the jackpot a winner will

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earn. If the lotto game had a winner on the previous game, the tickets sold will usually equal approximately double the pool to be shared among the winners. If the pool has some carryover because there were no winners in the most recent drawing, enter twice the amount that the announced winning pool increased since the last drawing. For example, when the Maryland Lotto recently built up to $21 million, the second-to-last drawing was about $6 million lower, so the number of tickets sold was approximately 12 million.

The first time that you pass this step running the program, LOTTO will pause for several seconds while it calculates a factorial table. That table is done within the subprogram COMBLOG, starting at line 27625. COMBLOG calculates the factorials and the combinations for LOTTO in logarithm form, and the subprogram is smart enough to calculate each factorial only if it is needed, and only once in each run of the main program. The next combination formula will be calculated much more quickly. COMBLOG is set to work for any number up to 250, so if you would like to use the subprogram to calculate larger combinations, increase the 250 in line 27645 of the subprogram and in line 360 of the main program.

The main loop begins on line 540. For each set of matching numbers, enter the match, whether the bet money is paid as a percentage of the betting pool, like Pennsylvania's prize for matching 7, or as a fixed amount (match 4 in PA.), or as a percentage of the remaining pool (match 5 or 6 in PA.). Those matches that come from the total pool must be entered first, so enter all the prizes in the order they are paid out from the winning pool.

As the matches are entered, LOTTO will display the match number and its odds, expectation, how many winners are likely, and how much cash each winner will win. If all the matches entered have prizes that are a percentage of the total pool, then LOTTO will know when all the matches have been entered, and display the totals automatically. If you have entered other types of prizes, LOTTO must be told when you finish, by entering zero at the prompt, "How many numbers must match...?"

The total screens for either the lotto analysis or the annuity analysis screens may be printed, and that printing is done as a text screen dump in the subprogram DUMP.

The totals are the combined expectation for all the matches, and the total odds for the lotto game. Because the carryover of prize money from one drawing to the next improves the payoff, different entries of tickets sold and winning pools will result in different expectations for different drawings. Although the numbers may indicate that the Lotto games become better bets when prize pools get very large, remember that your total odds of winning don't improve with the size of the pool. At its best, Lotto games still serve best as money collectors for the state.

LOTTO

```
90 PR$="RS232.DA=8.BA=4800"
! Default printer name !200
100 ! LOTTO !053
110 ! Lotto Analysis--TIXB-J
.L.Stern 10/'91 V. 1.0 !105
120 CALL CLEAR :: CALL SCREE
N(13):: CALL TITLE2 !186
130 ON WARNING NEXT !215
140 CALL COMBLOG(25,5,L)!189
150 CALL PAUSE !232
160 DISPLAY AT(1,5)ERASE ALL
:"Choose an Activity:":RPT$(
"_",28)!028
170 DISPLAY AT(4,1):"1 Calcu
late LOTTO Returns":"2 Value
 an annuity jackpot":"3 Help
 getting started":"4 Quit" !
250
180 CALL KEYAT(9,1,S,"1C2V3H
4Q")!136
190 ON POS("1C2V3H4Q ",CHR$(
S),1)GOTO 200,200,950,950,12
00,1200,1120,1120,180 !216
200 ! Calculate LOTTO Return
 !131
210 TODDS,EXPECT,TPC=0 !Tota
l odds, expectation and perc
ent of pool used !144
220 J2=0 !051
230 DISPLAY AT(1,4)ERASE ALL
:"Calculate LOTTO Return":RP
T$("_",28)!007
240 DISPLAY AT(19,1):RPT$("_
",28)!241
250 DISPLAY AT(20,1):"What i
s the name of the      LOTTO
game?" !174
260 CALL KEY(5,K,S):: ACCEPT
 AT(24,1):NM$ :: IF NM$="" T
HEN 160 !247
270 CALL HCHAR(1,1,32,30)::
DISPLAY AT(1,15-INT(LEN(NM$)
/2)):NM$ !054
280 DISPLAY AT(20,1):"How mu
ch does                one ti
cket cost?" !036
290 CALL HCHAR(24,1,32,32)::
 ACCEPT AT(24,1)VALIDATE(DIG
IT,".")SIZE(4):BET :: IF BET
=0 THEN 160 !209
300 DISPLAY AT(20,1):"How ma
ny sets of game        number
s are on one ticket?":"":":
"" !005
310 ACCEPT AT(24,1)VALIDATE(
DIGIT)SIZE(1):COUNT :: IF CO
UNT=0 THEN 160 !033
320 DISPLAY AT(3,1):USING "G
ames on a $####.## ticket:#"
:BET,COUNT !169
330 DISPLAY AT(20,1):"How ma
ny numbers will the    winnin
g numbers be chosen    from?"
:" ":" " !115
340 ACCEPT AT(24,1)VALIDATE(
DIGIT)SIZE(3):P !Pool of pos
sible numbers !058
350 IF P=0 THEN 160 !164
360 IF P<=250 THEN 380 ELSE
DISPLAY AT(20,1):"Too High!
  Raise the value in the COM
BLOG subprogram   dim statem
ent, and restart  the progra
m." !154
370 CALL PAUSE :: GOTO 330 !
004
380 DISPLAY AT(20,1):"How ma
ny numbers will the    lotter
y choose?":"":"":"" !158390
ACCEPT AT(24,1)VALIDATE(DIGI
T)SIZE(2):C !Chosen group !1
73
400 IF C=0 THEN CALL SOUND(1
00,330,3):: GOTO 390 !005
410 DISPLAY AT(20,1):"How ma
ny numbers will the    Gamble
```

(See Page 15)

EXTENDED BASIC—

(Continued from Page 14)

```
r choose?":" " !110
420 ACCEPT AT(24,1)VALIDATE(
DIGIT)SIZE(2):B !Bets placed
 !022
430 IF B=0 THEN CALL SOUND(1
00,330,3):: GOTO 420 !034
440 DISPLAY AT(5,1):"Match
   Odds         Returns" !044
450 CALL HCHAR(24,1,32,32)!2
22
460 DISPLAY AT(20,1):"How mu
ch is the prize pool?":" ":"
 " :: ACCEPT AT(24,1)VALIDAT
E(DIGIT)SIZE(9):JPOT !100
470 IF JPOT=0 THEN CALL SOUN
D(100,330,3):: GOTO 460 !069
480 JLEFT=JPOT !112
490 DISPLAY AT(20,1):"How ma
ny tickets were sold  for th
is drawing? (If not   known,
 enter twice this     week's
 increase in the      jackpo
t.)" !084
500 ACCEPT AT(24,11)VALIDATE
(DIGIT)SIZE(10):PLAYERS !188
510 ROW=5 ! Setup for loop !
169
520 DISPLAY AT(20,1):"":"":"
":"":"  Calculating the odds
..." !185
530 CALL COMBLOG(P,B,C1)!072
540 ROW=ROW+2 :: IF ROW>18 O
R TPC>.99 THEN 880 !019
550 DISPLAY AT(20,1):"How ma
ny numbers must match for th
e next prize?          (Enter
 0 when done.)":"":"" !130
560 ACCEPT AT(24,1)VALIDATE(
DIGIT)SIZE(2):M !135
570 IF M=0 THEN 880 !116
580 IF M>B THEN CALL SOUND(1
00,330,3):: GOTO 560 !005
590 DISPLAY AT(24,1):"  Calc
ulating the odds..." !205
600 CALL COMBLOG(C,M,C2)!071
610 CALL COMBLOG(P-C,B-M,C3)
!094
620 ODDS=C1-C2-C3-LOG(COUNT)
/2.302585093 !029
630 IF ODDS>10 THEN T$=STR$(
10^(ODDS-INT(ODDS)))&"E+"&ST
R$(INT(ODDS))ELSE T$=STR$(IN
T(10^ODDS))!034
640 DISPLAY AT(20,1):"For ma
tching";M;", is the":"prize
a Fixed amount or a   Percen
t of a prize pool? P":"":""
!020
650 CALL KEYAT(22,26,S,"FP")
!128
660 IF S=70 THEN 740 !037
670 DISPLAY AT(20,1):"Take t
he cash from the totalpool o
f money, or After the grand
prize? TA T" :: CALL KEYAT(2
2,17,S,"TA")!049
680 DISPLAY AT(20,1):"What p
ercentage of the prizepool i
s distributed for     matchi
ng";M;"?" !141
690 ACCEPT AT(22,15)VALIDATE
(DIGIT,".")SIZE(5):PAID !056
700 IF PAID=0 THEN 640 ELSE
IF PAID>1 THEN PAID=PAID/100
 !251
710 IF S=65 THEN 720 ELSE IF
 TPC+PAID>1.005 THEN CALL SO
UND(100,330,3):: GOTO 680 EL
SE TPC=TPC+PAID !247
720 IF S=84 THEN WON=JPOT*PA
ID*BET :: JLEFT=JLEFT-WON EL
SE WON=JLEFT*PAID*BET !240
730 GOTO 770 !084
740 DISPLAY AT(20,1):"How mu
ch does this bet win?":"":""
 !013
750 ACCEPT AT(21,1)VALIDATE(
DIGIT)SIZE(8):WON :: IF WON=
0 THEN 640 !221
760 JLEFT=JLEFT-WON*PLAYERS/
(10^ODDS):: PAID=0 !227
770 !sum expectation !156
780 TODDS=TODDS+(1/(10^ODDS)
)!045
790 WINNERS=PLAYERS/(10^ODDS
)!079
800 IF PAID=0 THEN EXPT=WON/
(10^ODDS):: DISTRIB=WON :: G
OTO 840 !168
810 DISTRIB=WON/MAX(1,WINNER
S)!166
820 IF DISTRIB>J2 THEN J2=DI
STRIB !204
830 EXPT=DISTRIB/(10^ODDS)!0
91
840 DISPLAY AT(ROW,1):USING
"Pick ## ########### $##.###
#":M,T$,EXPT !028
850 DISPLAY AT(ROW+1,1):USIN
G "####### Win $########## E
ach":WINNERS+.5,DISTRIB !231
860 EXPECT=EXPECT+EXPT !082
870 GOTO 540 !109
880 ! Totals formulas !163
890 DISPLAY AT(19,1):"    Od
ds 1:";1/TODDS:"Expectation"
;EXPECT !116
900 DISPLAY AT(21,1):"Pick";
B;"out of";C;"of";P !241
910 DISPLAY AT(22,1):JPOT;"W
inning pool":PLAYERS;"Ticket
s sold" !012
920 GOSUB 1170 !230
930 CALL PAUSE !232
940 GOTO 160 !239
950 ! Value an annuity jackp
ot !195
960 DISPLAY AT(1,3)ERASE ALL
:"Value an Annuity Jackpot":
RPT$("_",28)!008
970 DISPLAY AT(19,1):RPT$("_
",28):"How much is the jackp
ot?" :: IF J2>0 THEN DISPLAY
 AT(24,1):INT(J2*100)/100 !1
55
980 ACCEPT AT(24,1)VALIDATE(
DIGIT)SIZE(-12):P :: IF P=0
THEN 160 !164
990 DISPLAY AT(4,1):"$";P;"
Jackpot" !189
1000 DISPLAY AT(20,1):"Paid
over how many years?" !141
1010 ACCEPT AT(24,1):N :: IF
 N=0 THEN 160 !005
1020 P=P/N :: DISPLAY AT(5,1
):"Paid in";N;"installments"
 !059
1030 DISPLAY AT(6,1):USING "
of $#######.##":P !169
1040 DISPLAY AT(20,1):"How m
uch is the current     inter
est rate on bonds?" !078
1050 ACCEPT AT(24,1)VALIDATE
(DIGIT,"."):R :: IF R=0 THEN
 160 ELSE IF R>1 THEN R=R/10
0 !077
1060 DISPLAY AT(8,1):"Intere
st rate is now";R*100;"%" !1
41
1070 P=INT(P*100)/100 :: N=N
-1 :: CALL PRESENTVAL(P,R,N,
PV):: PV=PV+P !031
```

(See Page 16)

EXTENDED BASIC—

(Continued from Page 15)

```
1080 DISPLAY AT(10,1):"The v
alue of the annuity is:":"$"
;PV !124
1090 GOSUB 1150 !210
1100 CALL PAUSE !232
1110 GOTO 160 !239
1120 ! Quit !070
1130 DISPLAY AT(20,1)ERASE A
LL:"Remember...":"You have t
o play to lose!" !089
1140 STOP !152
1150 ! PRINT CHOICE SUBROUTI
NE !043
1160 CALL HCHAR(20,1,32,98)!
230
1170 DISPLAY AT(24,1):"Print
 the screen? Y/N" !176
1180 CALL KEYAT(24,23,S,"YN"
):: IF S=89 THEN DISPLAY AT(
24,1):" " :: CALL DUMP(PR$)!
095
1190 RETURN !136
1200 ! Help getting started
!085
1210 DISPLAY AT(1,5)ERASE AL
L:"Help Getting Started":RPT
$("_",28)!152
1220 DISPLAY AT(5,1):"   LOT
TO calculates the oddsand ex
pected return for     lotter
y games using multiplenumber
s. Most of these games" !186
1230 DISPLAY AT(9,1):"are pa
ri-mutuel, like a     horse
race--the winners     share
a jackpot among them. Option
 1 calculates the odds" !218
1240 DISPLAY AT(13,1):"and r
eturn on a LOTTO game. Optio
n 2 calculates the truevalue
 of an annuity jackpot." !13
3
1250 DISPLAY AT(17,1):"   Re
member: when lotto gamejackp
ots get big, more     ticke
ts are sold, so more  winne
rs share the jackpot." !149
1260 CALL PAUSE !232
1270 DISPLAY AT(1,5)ERASE AL
L:"Entering the Matches":RPT
$("_",28)!168
1280 DISPLAY AT(4,1):"   Som
e lottery agencies tryto mak
e the winning odds    diffic
ult to calculate.     There
are three types of" !039
1290 DISPLAY AT(8,1):"payoff
s--a percentage of thetotal
prize pool, or a fixedamount
 taken from the prize pool,
or a percentage taken" !068
1300 DISPLAY AT(12,1):"from
the cash remaining    after
 the other prizes have been
paid out. For each of" !054
1310 DISPLAY AT(15,1):"these
, you must choose Fixedpayof
f, Percentage of the  Total
 pool, or percentage ofthe p
ool After other prizes." !06
5
1320 DISPLAY AT(19,1):"   IM
PORTANT: The prizes   must
be entered in the same order
 they are awarded--all" !083
1330 DISPLAY AT(22,1):"prize
s paid from remaining  cash
must be entered LAST." !205
1340 CALL PAUSE :: GOTO 160
!089
27625 SUB COMBLOG(N,D,C)!027
27630 ! COMBLOG(NUMBER OF OB
JECTS,TAKEN AT A TIME,RETURN
 VARIABLE FOR LOG(10) OF COM
BINATIONS)WHERE ORDER DOESN'
T MATTER JLS 10/91 !102
27635 IF D>N THEN C$="" :: S
UBEXIT !155
27640 IF S>1 THEN 27655 !125
27645 DIM F(250)! Factorial
logs !172
27650 FC=0 :: F(0)=0 :: S=10
 !initial factorial precalc.
 !077
27655 IF MAX(S,N)<FC THEN 27
665 !098
27660 FOR L=FC+1 TO MAX(S,N)
:: F(L)=F(L-1)+LOG(L):: NEXT
 L :: FC=MAX(S,N)!060
27665 C=(F(N)-F(N-D)-F(D))/2
.302585093 !187
27670 SUBEND !168
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+.
05 !085
27690 PV=INT(PV*100)/100 ::
SUBEND !175
28040 SUB KEYAT(R,C,X,V$)!21
7
28045 ! KEYAT(Row, Column, A
SCII Return variable, Valida
tion string) JLS 2/91 !033
28050 ! Combines cursor flas
h with single key entry, val
idation !111
28055 C=C+2 :: CALL GCHAR(R,
C,N(0)):: N(1)=N(0):: N(2),N
(3)=30 :: V$=V$&CHR$(13)!000
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 ELSE IF X=13 THE
N X=N(0)!059
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 !1
15
31220 CLOSE #9 :: SUBEND !21
1
31565 SUB TITLE2 !035
31575 DISPLAY AT(7,12)ERASE
ALL:"LOTTO" :: CALL CHAR(95,
"00FF"):: CALL HCHAR(8,14,9
,5)!035
31580 DISPLAY AT(12,2):"Lott
o Game Odds Calculator" !24
31590 DISPLAY AT(19,5):"Oct
 1991 Jerry Stern" !021
31595 SUBEND !168
```

Converting text files

PC-Transfer is easiest, but there are other methods

By JOHN KOLOEN

What does it take to transfer TI text files into a format that can be read by a PC?

The answer to depends on the type of disk controller you have in your TI or Geneve, as well as whether you have a modem or whether you have a PC and TI in the same room. You see, there are several ways of getting the job done, but it depends on what kind of software and hardware is available

This article is not a tutorial, so don't expect a step-by-step outline of the process. What we're doing here is outlining the options.

SOFTWARE SOLUTIONS

Depending on the disk controller in your TI system, you may be able to use one of two programs designed to easily transfer text files between a TI and a PC. But, to use either program, you will need to have two double-sided, double-density disk drives. This means that readers with TI controllers are out of luck, since a TI controller can't read double-density format. PC disks can't be read by a single-density drive.

Now, if you have double-density drives, you probably also have a Myarc or CorComp disk controller. That's good, because if you do you may be able to use TI-IBM Connection by CorComp or Mike Dodd's PC-Transfer.

TI-IBM Connection works only with a CorComp disk controller and a TI99/4A. Disk drive one is used for the PC part of the conversion and disk drive two is used to hold the TI disk. The cartridge-based program cannot be used with RAMdisks and is not able to format a PC disk. TI-IBM Connection was reviewed in the September 1987 MICROpendium.

PC-Transfer is much more flexible. PC-Transfer is a diskette-based program and supports both Myarc and CorComp controllers. After loading, the user may designate any drive to accept PC or TI disks. RAMdisks may be used as the TI drive. The program is also capable of formatting PC disks. PC-Transfer was reviewed in the April 1988 MICROpendium.

But what do you do if you have a TI controller and single-density drives?

USE A MODEM

Another easier way to do the job is to send the files via modem from the TI to a PC, or vice versa. All it takes is a TI with a modem and a PC with a modem.

Or, you can do it if all you have is a single modem, as long as you have cables that can be used to connect it to a TI and a PC. In this case, you would upload your text files to a personal filing space in a BBS and then attach the modem to the PC and download the files to the PC. These text files will then be readable by PC word processing files.

RS232 CONNECTION

Another way to transfer programs is via a null modem, or direct connection of a TI RS232 port with a PC RS232 port. (Examine the cable connection in Fig. 1 to connect the TI99/4A to a PC.)

One program that was designed specifically for this purpose was PEP (Printer Emulation Package) by Intelpro. This program was reviewed in the November 1986 MICROpendium but had limited availability.

However, there is still hope even if you don't have a modem and can't get a hold of PC-Transfer, TI-IBM Connection or PEP, as long as you've got a TI and a PC in the same room. This is a similar process to that used by PEP, only not as sophisticated. In addition to the two computers, you will also need an RS232 cable long enough to connect the TI RS232 port to the PC serial port.

First, connect the TI RS232 port to the PC serial port. You can write a simple program, such as the listing below by Gary Bishop, that will open a file and send it to the RS232 port and then close the file when the transfer is completed. However, since you're transferring only text files (D/V80 format), you may prefer to use TI-Writer to send the files from TI-Writer to the PC. After loading the text file into memory, enter PF (Print File) from the command line and then enter the device you are sending to, in this case RS232. You will probably have to type in DA=8.BA=4800

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TRANSFERRING FILES—

(Continued from Page 17)

for the number of data bits and the baud rate (remember, this is a serial transmission).

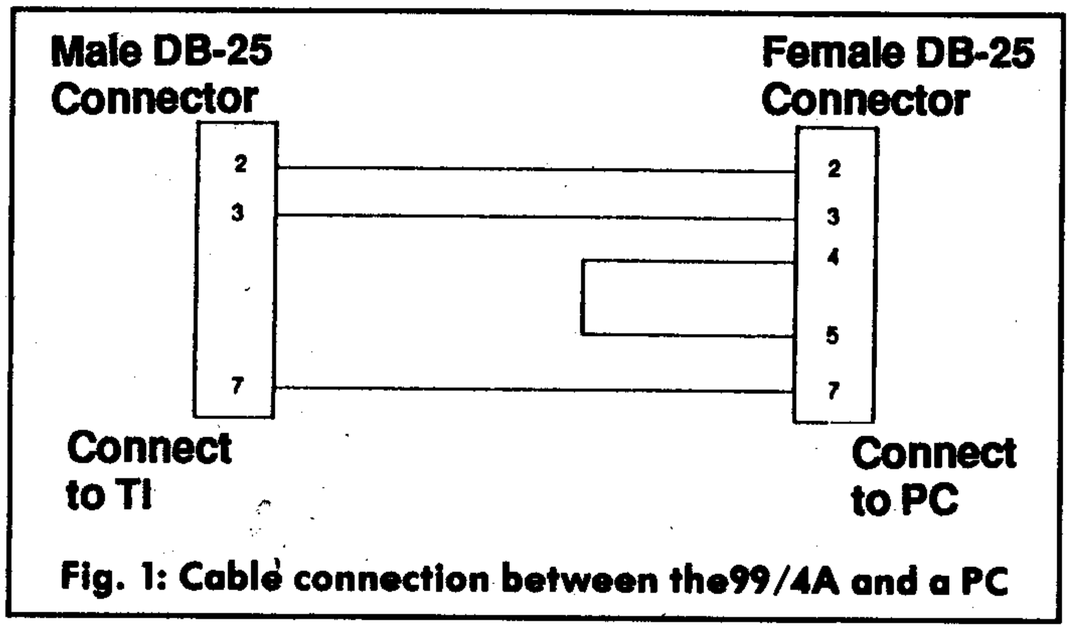

Fig. 1: Cable connection between the99/4A and a PC

You may have to do a little trial and error work using this method, but it works. I used to transfer text files this way this way before I got a copy of PC-Transfer. In fact, I used the serial port method to connect PCs to my TI as well as typesetters.

Of course, you can also send text from the PC to a TI using the same technique.

D/V80.ZIP

This is also a program available on bulletin boards such as GEnie that works out of a PC. The program is called DV80.ZIP. Although I haven't used it, it is designed to transfer TI D/V80 files to a PC. The program is available on the TI-SIG of GEnie, and perhaps on Delphi and CompuServe as well, but must be downloaded using a PC, not a TI. Of course, if you've got a modem in the first place, you can just send your files to the PC.

```
100 INPUT "FILENAME TO TRANSFE
R: ":F$
110  OPEN  #1:F$,INPUT,DISPLAY,VA
RIABLE 80
120 OPEN #2:"RS232.BA=1200"
125 IF EOF (1) THEN 160
130 LINPUT #1:A$
140 PRINT #2:A$
150 GOTO 125
160 CLOSE #1
170 CLOSE #2
180 STOP
```

The Art of Assembly - Part 5

Useful subroutines

By BRUCE HARRISON
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This month's article will be relatively short, but it's accompanied by a large dose of source code (see sidebar). The source code for today is all subroutines, one of the High level variety (a subroutine that calls other subroutines) and several smaller ones.

The major purpose in this source code is to get user input from the keyboard, display it stroke by stroke on the screen, then when the ENTER key is pressed, to report out what's on the screen into a string at one specific location in memory. In effect, this is like the Extended BASIC ACCEPT AT function for a string variable. The version shown was developed for use in our Golf Score Analyzer program. In this listing, however, we've left out the lines that deal with the character offset for Extended BASIC. Thus this subroutine can be easily integrated into any Option 3 E/A type program. The label names used reflect its "Golf" origins to some extent, as the name of the big subroutine CRSIN, short for Course Name Input. In that program, this was actually used for any occasion when we wanted to accept a string of characters from the keyboard.

There is an auxiliary subroutine which we call CLRFLD (clear field) also included in the sidebar. That is used before CRSIN, to clear the screen area into which we want user input. One can also use CRSIN without the CLRFLD, so that something already in that screen location can be edited or accepted as a default entry.

(See Page 19)

```
0001  * SUBROUTINES WHICH MAY PROVE USEFUL
0002  * DESIGNED FOR USE IN OPTION 3 E/A PROGRAMS
0003  * CODE BY BRUCE HARRISON - PUBLIC DOMAIN
0004  * 22 JUNE 1991
0005  *
0006  * REQUIRED REFERENCES
0007        REF  KSCAN,VMBW,VMBR,VSBW,VSBR
0008  *
0009  * REQUIRED EQUATES
0010  STATUS EQU  >837C
0011  KEYADR EQU  >8374
0012  KEYVAL EQU  >8375
0013  *
0014  * THE FOLLOWING SUBROUTINE ACCEPTS A STRING OF CHARACTERS STARTING AT LOCA
TION
0015  * POINTED TO BY R0, NUMBER OF CHARACTERS TO ACCEPT MUST BE IN R4
0016  * INPUT STRING IS PLACED AT LOCATION TEMSTR
0017  *
0018  CRSIN
0019        MOV  R11,*R15+    STACK RETURN ADDRESS
0020        CLR  @INSFLG      CLEAR OUR INSERT FLAG
0021        MOV  R0,@PGNUM    STASH R0 IN MEMORY LOCATION
0022        DEC  R0           DECREMENT R0
0023        MOVB @EDGE,R1     PLACE EDGE CHARACTER IN LEFT BYTE R1
0024        BLWP @VSBW        WRITE EDGE CHARACTER TO SCREEN
0025        INC  R0           RESET R0 TO ORIGINAL VALUE
0026        A    R4,R0        ADD NUMBER OF CHARACTERS TO ACCEPT ;
0027        BLWP @VSBW        WRITE AN EDGE CHARACTER TO SPOT BEYOND FIELD
0028        MOV  R0,@ENDOC    SAVE THIS LOCATION IN MEMORY
0029        S    R4,R0        RESET R0 TO ORIGINAL VALUE
0030        MOV  R4,@SAV4     STASH R4 IN MEMORY
0031  CRSI0A BLWP @VSBR       READ THE CHARACTER POINTED TO BY R0
0032        MOVB R1,@ALTKEY   STASH THAT CHARACTER AT LOCATION ALTKEY
0033  CRSI0  BL   @CURFRC     FORCE THE CURSOR ONTO THE SCREEN
0034        BL   @KI2         USE THE SCANNING SUBROUTINE WITH FLASHING CURSOR
0035        CI   R8,9         HAS RIGHT ARROW BEEN STRUCK?
0036        JEQ  CRSRT        IF SO, JUMP
0037        CI   R8,8         HAS LEFT ARROW BEEN STRUCK?
0038        JEQ  CRSBK        IF SO, JUMP
0039        CI   R8,10        DOWN ARROW?
0040        JLT  CRSC4        IF LESS, JUMP
0041        CI   R8,15        HAS FUNCTION-9 BEEN STRUCK?
0042        JEQ  CRSDMY       IF SO, JUMP
```

ART OF ASSEMBLY—

(Continued from Page 18)

Let's say that we want to accept a 20 character string with a cleared field at Row 12, column 5 of the display screen. Here's what the main program would need to do to invoke the subroutines:

LI R0,SCRWID*11+4 Set R0 to Row 12, col 5
LI R4,20 Number of characters in R4
BL @CLRFLD Clear 20 characters at row 12 col 5
BL @CRSIN Accept the input string

Note that the subroutine CLRFLD restores the original value in R0 and retains the value in R4 upon exit, so the main program need not reload those two registers before calling CRSIN.

Also please note that this subroutine will not work if R0 is zero. If it's set to a value of 1, the accept will happen at Row 1, Column 2 of the screen. The adept student may modify it so it would work at the screen origin, but we've never found it necessary (or desirable) to accept a string at that screen position.

Before we get further into how this subroutine CRSIN works, we'd better deal again with that business of stacking the return address for this High level case. What's shown here assumes that your program contains other High level subroutines and that somewhere early in the program you'd pointed R15 at a stack location in memory. If this were the only high level subroutine in your program, you could simply stash R11 in R15 itself, so the opening line in CRSIN would read:

CRSIN MOV R11,R15

And the exit point would be:

CRIX B *R15 Branch to the address in R15

The other possible case is that you'd have CRSIN as the first High level subroutine in your program, in which case CRIX would be a label only, and would be followed by the short piece of code shown at label SUBRET.

The subroutine CRSIN uses three others to do its work. For normal keystroke inputs, it uses CURFRC to put the cursor on-screen, then uses KI2 to accept your keystroke into R8. When the input keystroke is one of the two "arrow" keys Function-S or Function-D, the special repeat-key subroutine KI2A is used. Using that subroutine allows the cursor to be moved through the input field by holding down the arrow key. There is a built-in delay in this subroutine, so the cursor will not fly to the end of the field, but move in human-speed steps. The subroutine exits immediately if you release the key. The delay imposed is modified by the subroutine, so the delay after the first cursor move is considerably less than the first move. Moving the byte at location ONE to location KI2A+2 clears the left byte of the immediate value that follows the label KI2A. When you exit by releasing the arrow key, the main subroutine re-sets the delay factor for a first arrow move.

This idea of having the code modify itself while you're using it is tricky, and many programmers shun its use. We considered it a worthwhile thing to do in this instance, to make the movement of the cursor more like what the TI user is accustomed to seeing.

Now let's start at the beginning of the subroutine. Some important things happen there. On entry, after stashing the return address, we clear our insert flag, so that we're sure insert mode won't be on when we didn't ask for it.

(See Page 24)

```
0043          CI   R8,13          HAS ENTER KEY BEEN STRUCK?
0044          JLT  CRSDMY         IF LESS, JUMP
0045  CRSC4   CI   R8,4           HAS FUNCTION-2 (INSERT) BEEN STRUCK?
0046          JNE  CRSENT         IF NOT, JUMP
0047          INC  @INSFLG        ELSE SET INSERT FLAG
0048          JMP  CRSI0          THEN JUMP BACK
0049  CRSENT  CB   @KEYVAL,@ENTERV HAS ENTER BEEN STRUCK?
0050          JEQ  CRSDMY         IF SO, JUMP
0051          CI   R8,3           HAS FUNCTION-1 (DELETE) BEEN STRUCK?
0052          JEQ  CRSDEL         IF SO, JUMP
0053          CI   R8,32          SPACE BAR
0054          JLT  CRSI0          IF LESS, JUMP
0055  * THE FOLLOWING FIVE LINES ARE NEEDED ONLY IF ONE WANTS LOWER CASE
0056  * CHARACTERS CONVERTED TO UPPER CASE.  IF NOT, OMIT THESE FIVE LINES
0057          CI   R8,122         COMPARE TO LOWER CASE Z
0058          JGT  CRSI0          IF GREATER, JUMP
0059          CI   R8,97          COMPARE TO LOWER CASE A
0060          JLT  CRSI1          IF LOWER, JUMP
0061          SB   @ANYKEY,@KEYVAL ELSE SUBTRACT >20 FROM KEYSTROKE
0062  CRSI1
0063          MOV  @INSFLG,R1     TEST IF INSERT FLAG ON
0064          JEQ  CRSI1A         IF NOT, JUMP
0065          MOVB @ALTKEY,R1     ELSE WRITE CURRENT CHARACTER
0066          BLWP @VSBW          TO CURRENT SCREEN POSITION
0067          MOV  @ENDOC,R2      MOVE LIMIT ADDRESS INTO R2
0068          S    R0,R2          SUBTRACT CURRENT R0 POSITION
0069          LI   R1,TEMSTR      POINT TO TEMSTR LOCATION
0070          BLWP @VMBR          READ CHARACTERS FROM SCREEN
0071          DEC  R2             DECREMENT CHARACTER COUNT
0072          JEQ  CRSI1A         IF R2 IS ZERO, NO INSERT - WE'RE AT LAST POSITION
0073          INC  R0             INCREMENT SCREEN POSITION
0074          BLWP @VMBW          WRITE CHARACTERS BACK
0075          DEC  R0             POINT BACK ONE SPOT
0076  CRSI1A  MOVB @KEYVAL,R1     MOVE THE KEY STRUCK INTO LEFT BYTE R1
0077          BLWP @VSBW          WRITE KEY VALUE TO SCREEN
0078          INC  R0             POINT AT NEXT CHARACTER POSITION
0079          BLWP @VSBR          READ CHARACTER THAT'S THERE
0080          CB   R1,@EDGE       IS THIS AN EDGE CHARACTER?
0081          JNE  CRSI0A         IF NOT, JUMP
0082          DEC  R0             ELSE BACK UP ONE CHARACTER
0083          JMP  CRSI0A         THEN BACK FOR ANOTHER KEY INPUT
0084  CRSRT   MOVB @ALTKEY,R1     TAKE CURRENT SCREEN CHARACTER INTO LEFT BYTE R1
0085          BLWP @VSBW          WRITE CHARACTER TO SCREEN
0086          CLR  @INSFLG        CLEAR THE INSERT FLAG
0087          INC  R0             MOVE TO NEXT SPOT
0088          BLWP @VSBR          READ THE CHARACTER THERE
0089          CB   R1,@EDGE       IS THAT EDGE CHARACTER?
0090          JEQ  CRSRT1         IF SO, JUMP
0091          MOVB R1,@ALTKEY     ELSE STASH CURRENT SCREEN CHARACTER
0092          BL   @CURFRC        FORCE CURSOR ONTO SCREEN
0093          BL   @KI2A          GO SCAN KEYBOARD
0094          CB   @KEYVAL,@RITEV IS RIGHT ARROW STILL HELD DOWN?
0095          JEQ  CRSRT          IF SO, KEEP GOING RIGHT
0096          CB   @KEYVAL,@NOKEY HAS NO KEY BEEN STRUCK?
0097          JEQ  CRSRT2         IF SO, JUMP
0098  CRSRT1  DEC  R0             BACK TO PREVIOUS SPOT
0099  CRSRT2  MOVB @ONOFF,@KI2A+2 RESTORE DELAY CONSTANT
0100          MOVB @ALTKEY,R1     GET CHARACTER INTO LEFT BYTE R1
0101          BLWP @VSBW          WRITE TO SCREEN
0102          JMP  CRSI0          THEN JUMP BACK FOR ANOTHER KEY
0103  CRSBK   MOVB @ALTKEY,R1     GET CURRENT CHARACTER IN R1
0104          BLWP @VSBW          WRITE TO SCREEN
0105          CLR  @INSFLG        CLEAR INSERT FLAG
0106          DEC  R0             BACK ONE SPOT
0107          BLWP @VSBR          READ CHARACTER FROM SCREEN
0108          CB   R1,@EDGE       IS THAT EDGE CHARACTER?
0109          JEQ  CRSBK1         IF SO, JUMP
0110          MOVB R1,@ALTKEY     ELSE STASH CHARACTER AT ALTKEY
0111          BL   @CURFRC        FORCE CURSOR ONTO SCREEN
0112          BL   @KI2A          GO GET KEYSTROKE
0113          CB   @KEYVAL,@LEFTV  IS LEFT ARROW STILL HELD DOWN?
0114          JEQ  CRSBK          IF SO, GO BACK AGAIN
0115          CB   @KEYVAL,@NOKEY HAS NO KEY BEEN STRUCK
0116          JEQ  CRSRT2         IF SO, JUMP
0117  CRSBK1  INC  R0             MOVE TO NEXT SPOT
0118          JMP  CRSRT2         THEN JUMP
0119  CRSDMY  JMP  CRSIX          THIS IS A DUMMY JUMP TO KEEP JUMPS IN RANGE
0120  CRSDEL  MOV  R0,R7          STASH R0 IN R7
0121          CLR  @INSFLG        CLEAR INSERT FLAG, SINCE WE'RE DELETING
0122          MOV  @ENDOC,R2      END OF FIELD ADDRESS IN R2
0123          S    R0,R2          SUBTRACT CURRENT CHARACTER ADDRESS
0124          INC  R0             POINT TO NEXT CHARACTER
0125          DEC  R2             DECREMENT R2 COUNT
0126          JEQ  CRSD1          IF R2 ZERO, PRINT SPACE - WERE AT LAST POSITION
0127          LI   R1,TEMSTR      POINT R1 AT TEMSTR FOR TEMPORARY STORAGE
0128          BLWP @VMBR          READ CHARACTERS INTO LOCATION TEMSTR
0129          MOV  R7,R0          PUT BACK R0
0130          BLWP @VMBW          WRITE CHARACTERS FROM TEMSTR TO SCREEN
0131  CRSD1   MOVB @ANYKEY,R1     PUT A SPACE IN LEFT BYTE R1
0132          MOV  @ENDOC,R0      GET LIMIT SPOT INTO R0
0133          DEC  R0             DECREMENT BY ONE
0134          BLWP @VSBW          WRITE A SPACE TO SPOT JUST BEFORE LIMIT
```

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#22. ASTROLOGY
This one is as good as anything you will see in an arcade. Great color graphics and displays of the Zodiac. Enter your birthdate and learn about your sign, your lucky days and famous events in history on your birthday. Even prints out a report. Can be used as a great moneymaker at a charity event. Help guide your spouse's career.

#23. WILL WRITER
Enter your answers to a group of computer asked questions and this program then writes you a last will and testament. Now you can leave your TI-99/4A to your favorite nephew. Works with any printer. Appears legal in all states but better check that out!

#24. ENGINEERING CALCULATIONS
A two sided computer handbood of dozens of the most often used engineering and technical formulas. A real time saver. Does conversions, calculations and even designs electrical circuits. A must for anyone whose profession or hobby involves scientific calculations. Even has medical and communications applications.

#25. MEDICAL ALERT
This disk contains many menu accessible files covering most everyday medical emergencies. A good "what to do until the doctor or paramedic comes" guide. Well written and organized. Could very easily save a life!

#26. R RATED GAME
It was bound to happen. A talented (but demented) programmmer in Germany wrote an Invaders type game but with most unusual guns and targets. Definitely not what you would find at your neighborhood arcade. Not only a great party game but some great programming. You must be over 18 to order this one!!

#27. KIDS LEARNING
An educator in Georgia put this two sided disk collection of educational programs together. Contains great material. Math, geography, reading improvement, and even IQ testing. All high quality programs for kids of all ages.

#28. LOADERS AND CATALOGERS
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.

#29. LABEL MAKER I
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.

#30. HOUSEHOLD BUDGET PRINTOUT
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.

#31. MORSE CODE TRAINER DISK
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.

#32. EXBASIC XMAS MUSIC
Two disk sides full of high quality xmas music that can be played throughout the holiday season and then used as a learning tool since it contains wonderful arrangements and graphics. Autoloading and menu driven.

#33. CHECKERS & BACKGAMMON
A collection of great checkers and backgammon games for the TI-99/4A. These are professional in quality and will keep you busy for hours.

#34. SOLITAIRE & SCRABBLE
Another collection of classic games for the TI-99/4A. Exbasic & 32K req.

#35. PROGRAMMING AIDS & UTILITIES I
A collection of some unusual programs of interest to programmers. One program shows a group of opening title displays, another is a cross reference program as good as any of the commercial ones, plus a great disk management utility.

#36. STRICTLY BUSINESS
A collection of various programs for evaluating loans, calculating interest, and other financial items such as return on investment and security performance. Two disk sides filled with financial and business related programs.

#37. LAPD COOKBOOK
This unofficial police cookbook was put together by one of our boys in blue who is also a gourmet chef. (Yes, it contains jailhouse chili) Over 50 great receipes from soup to nuts on two disk sides and each separate side can be called up on screen or printer in exbasic from a menu. As good as any of the new PC computer cookbooks we have seen.

#38. GREAT 99/4A GAMES VOL. I
A collection of professional games in assembly and exbasic that all load from a menu in exbasic. Includes a great ski game where you dodge the trees in a fast downhill run. We have included only the best.

#39. GREAT 99/4A GAMES VOL. II
Still more of the great ones from all over the world. The quality, graphics and speed of many of these games will make you wonder why they were never released commercially.

#40. ARTIFICIAL INTELLIGENCE
This disk contains the famouse computer program "Eliza" where you type in a question or a problem you are having and "Eliza" helps you find the solution. Also contains one of the better bio-rhythm programs so you can analyze all your emotional problems at one sitting.

#41. VIDEO GRAPHS MODULE BACKUP DISK
This disk is a backup of the discontinued Video Graphs Module from TI. For legal reasons, it can only be purchased for backup use by owners of the original module. Do not order UNLESS you have the original module and intend to use this disk only for backup purposes. Exbasic autoload...

#42. FUNNELWEB FARM UTILITY
You heard about this one, now direct from Australia is the latest version of this fantastic utility that puts everything at your command. From one program you can access word processing, editor assembler, telecommunications and just about everything else. A freeware program complete with documentation on a second disk side.

#43. BEST OF BRITAIN, VOL I
Now for the first time, a collection of the best 99/4A games Britain has to offer including the famous "Billy Ball" series of arcade games. Great graphics, action and excitement.

#44. LABEL MAKER I GRAPHICS
A disk filled with graphics for the Label Maker I disk (#29). Dozens of great graphics for custom labels!

#45. BEST OF BRITAIN, VOL II
This disk contains an outstanding 3-D graphics adventure game for the TI-99/4A. Carfax Abbey lets you actually move through a four story mansion complete with bats and vampires. You actually are placed in each room and go up and down stairs and through secret panels. Legend of Zelda...look out!

#46. SUPER TRIVIA 99
A great trivia game for 1 to 4 players with great questions and capability to add your own and print out the files. This one is a real challenge.

#47. INFOCOM RAPID LOADER
If you have Infocom games this is for you. Loads all TI Infocom games in only 28 seconds and permits new screen colors and improved text display. Comes with all documentation on disk.

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#48. GHOSTMAN (from England)
This Pacman/Munchman type game starts at a slow pace and slowly speeds up to a break-neck pace. A totally new experience.

#49. DEMON DESTROYER (from France)
This great assembly game starts where Invaders leaves off. Add features like descending aliens and closing walls. Hours of great arcade action.

#50. OH MUMMY (from Germany)
Move through the chambers of a Pyramid in search of hidden treasure. Fantastic graphics and great entertainment.

#51. BERLIN WALL (from Canada)
This game requires a mine field to be crossed before escaping from E. Berlin. Good graphics and a real challenge.

#52. ANIMATION 99 (from Germany)
THIS IS THE ONE!!! A demo disk filled with computer animation routines like you have never seen before on any computer. See famous cartoon figures move with more realism that on Sat. morning TV. This disk received a standing ovation when previewed at a local users group. We have even included instructions how to do it yourself on the second disk side. This one is a show stopper!!!

#53. HACKER/CRACKER
A collection of disk copying programs that copy TI disks by tracks. If one of these can't copy a protected disk nothing will. We included a collection of the very best ones including both TI and CorComp compatible. These programs require 2 disk drives and 32K of memory.

#54. ASTRONOMY
This program from Australia plots the heavens and teaches you about the solar system. A great learning and reference tool. Exbasic and 32K required. Don't confuse this one with our Astrology demo. They are not the same...ask Nancy!

#55. SCREEN DUMP
This program allows you to dump disk and even module programs to a Star/Epson compatible printer. Comes with easy to follow plans to build a load interrupt switch which is needed to dump module programs. This dump program by Danny Michael is considered the best of the bunch! Complete with documentation.

#56. SPREAD SHEET
OK, it's not Multiplan but it works great and handles many spread sheet applications. A great way to learn to use spread sheet software. Comes with full instructions and documentation.

#57. TELCO
Considered one of the best data communications programs for the TI-99/4A. Complete with documentation.

#58. PR BASE
The alltime most popular and widely used data base program for the TI-99/4A. A freeware program that is widely supported and updated.

#59. GRAPH MAKER
A collection of the best programs for producing graphs and charts from your data. Exbasic and printer.

#60. FREDDY
A fantastic game where you guide the hero through underground passages filled with danger. Nintendo quality, great graphics and fast action. One of the best we have ever seen!!!

#61. THE MINE
A fast action game from F.R.G. that will keep you going for hours. Many screens and skills required.

#62. DISK MANAGER II MODULE BACKUP
The complete TI Disk Manager II on Disk. For legal reasons it is only available to owners of the original module for backup use.

#63. ASTROBLITZ/MAZOG
A pair of great games that continue where Parsec and Munchman leave off. Imagine Parsec with enemy space craft coming from in front and in back of your ship!!!

#64. MAJOR TOM/SPACE STATION PHETA
A pair of great space games. These two are going to keep you in front of the 99/4A for hours. Great!

#65. PERFECT PUSH
An all new space game where you assemble and launch a rocket ship in outer space while avoiding a space monster. This one is professional in very way..graphics. speed and action!!!

#66. HEBREW TYPEWRITER
This program converts your TI-99/4A keyboard into a typewriter that displays Hebrew letters on the screen. Can also be printed when used in conjunction with screen dump program (included). Great for religious training or making your copy of the dead sea scrolls or ten commandments!

#67. GENEALOGY
Now you can set up your family tree and store or print out the records. Great for keeping track of family relationships and records.

#68. CHESS
The original computer chess game Sargon has been reprogrammed for the TI-99/4A. Now play chess with your computer. Documentation included. Exbasic autoload.

#69. COMPUTER PLAYER PIANO/KEY-BOARD CHORD ANALYSIS
A unique music program which displays a piano on the screen and actually plays your selections.

#70. TI RUNNER II
The very latest (and best) "runner" game based on TI Runner and Star Runner. Great action, graphics and entertainment.

#71. KIDS LEARNING II
Two more disk sides loaded with the best in educational programs. Kids improve their math, spelling and comprehension skills while having fun.

#72. CERBERUS
Fantastic space game from Germany. Pilot your ship through narrow and crooked channels in space without colliding. Great graphics and music.

#73. CRYPTO (gram)
One of the best word games we have seen for any computer. Set up like a TV game show with great screen displays.

#74. LABEL MAKER II
Make labels for holidays and special events. You compose the text and select the resident graphics for the occasion.

#75. DISK CATALOGER
Now you can organize your disk files with this great utility. Files, sorts, and prints your records. Easy to use.

#76. PROGRAMMING AIDS AND UTILITIES II
A collection of very useful material. Includes a program to convert basic to exbasic so your old basic programs will load & run in exbasic, even with graphics. Also includes two on screen diagnostic programs to test your keyboard and processor. A great merge utility is also on this disk.

#77. MICROdex 99
A database program by Bill Gaskill which files and retrieves data such as magazine articles. A sample database is included.

#78. ARTCON+ BY RAY KAZMER
ATTENTION GRAPHX AND TI ARTIST USERS!!!
This program lets you convert Exbasic graphics to TI Artist and Graphx pictures. Also contains a new MAC-RLE (2) for converting from Artist to Graphx.

#79. DM1000 V3.5
One of the most popular disk managers for the TI-99/4A. Originally a rip-off of the CorComp manager, it has been improved and refined by talented users all over the world. This version is deemed the most reliable to date and is far advanced over the TI Disk Manager II. Distributed by permission from CorComp.

#80. BIRDWELL DISK UTILITY
A must if you are iunto programming and software development. Besides being a great disk manager, it has provision for copying sectors, comparing files and is menu driven. Complete with documentation.

#81. HOME ACCOUNTING SYSTEM
A complete family & small business accounting system including a checkbook manager, budget analysis, mailing list and an inventory program. Complete with documentation. Easy to modify for specific needs.

#82. CROSSWORD PUZZLES
This program from Australia creates a different puzzle each time you run it. Self contained with definitions and vocabulary taken from a leading crossword dictionary. Great crossword fun.

#83. HOME APPLICATION PROGRAMS
A two disk side collection of useful programs for the home. Includes banking, cooking, home bar guide, utility records, and much much more. Something for everyone.

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#84. GALACTIC BATTLE/SPY ADVENTURE
A pair of great commercial quality games from EB Software of TI Runner fame. Galactic Battle is a space "trek" type strategy game for one or more players. Spy Adventure is an adventure game that will keep you guessing for hours.

#85. AUTOBOOT UTILITY
This utility which can be installed on a disk loads and runs or displays most files. Now you can have a disk with exbasic programs, Editor Assembler programs and TI Writer files and run or display them all from exbasic.

#86. COLUMN TEXT III V3.2
A very useful,utility for printing TI Writer and 99 Writer II files in separate spaced columns. Saves hours in producing a newsletter. Complete with documentation.

#87. ARCHIVER III
This utility allows you to "pack" or combine several files into one for space utilization. A number of boards are sending files packed to save transmission costs. This utility will let you pack and/or unpack these files.

#88. AUSSIE GAMES VOL 1
A collection of games from our friends down under. Includes a great card game and board game. Hours of fun and entertainment. Includes Matchmaker & TILO.

#89. PROCALC
This is an on screen calculator for decimal/hexidecimal conversions and much more. A must for the serious programmer.

 # 90. JET CHECKBOOK MANAGER
This checkbook manager is considered the ultimate with every feature you can think of for keeping track of your checking account and keeping records of your spending for budget and tax purposes. Complete with documentation.

#91. "THE MAZE OF GROG"(St. Valentine)
Ray Kazmer has created a great maze game with fantastic graphics and the characters from his now legendary "Woodstock" disk. Fun for all!!!

#92. HOUSEHOLD INVENTORY
Written by 99/4 programming great Charles Ehninger, this prize winner originally sold for $59.95. Keeps track of household, business or personal items by category and provides automatic updating for inflation etc. A must for tax and insurance records!

#93. THE 1991 KBGB GIRLIE CALENDAR
This latest offering from programming master Ken Gilliland prints out a jumbo 12 month calendar with a knock-out centerfold pinup for each month. If you like our #14 Figure Study disk, you will flip over this one. For Adults Only!! Exbasic & d/m printer.

#94. GREAT 99/4A GAMES VOL. 111
If you have seen vols. 1 & 2 of this series you know we only provide the very best. This latest volumn is also filled with a collection of great ones!

#95. WEATHER FORECASTER
The weather predictions are amazingly reliable and accurate! A great game "Lawnmower" and a mini database are also included to make this disk a fantastic value.

#96. STATISTICS & SORTING
Two great assembly utilities by John Clulow. STAT is a set of statistic routines for use in exbasic. SORT allows sorting by two separate fields and a choice of two types of sorts.

#97. MEMORY MANIPULATOR
This powerful utility lets you explore the entire memory in your 99/4A system and take apart what you find. User friendly!

#98. DAYS OF EDEN & DOORS OF EDEN
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!

#100. ASSULT THE CITY (T. of DOOM)
An exciting game for use with the Tunnels of Doom module. Several Exbasic bonus games are included.

#101. ENCHANCED DISPLAY PACKAGE
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.

#103. SORGAN, THE 99/4A ORGAN
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.

#104. C99 COMPILER AND LIBRARY
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)

#105. KING'S CASTLE+
A great arcade style assembly game formerly offered on module. Also includes an EB "Trek" game and a collection of sprite & graphics from Tigercub's Jim Peterson.

#106. QUEST (Dungeons & Dragons)
One of the best D&D games around! You must destroy the Dark Lord to free your homeland! Complete with documentation on disk.

#107. STAR TREK MUSIC ALBUM
Ken Gilliand's music and graphics version of the TV theme and the three motion pictures. (Exbasic)

#108. FUNLPLUS BY JACK SUGHRUE
Fantastic disk packed with Funnelweb (#42) templates, utilities and prog. to augment and configure Funnelweb. Unbeliveable collection of fantastic aids to make the best even better!

#109. TI-WRITER MINI MANUAL
This disk prints out a five page TI Writer manual with everything you need to know to use TI Writer or the many clones such as 99Writer II. Additional aids for using this powerful word processor are included.

#110. DISK + AID
A powerful disk sector editor formerly sold for $20. Menu Driven and easy to use.

#111. POP MUSIC & GRAPHICS
This exciting disk from Germany features music/graphics written in 100% assembly and what comes from the TI sound chip is sure to astound you.

#112. INVOICE PACK
An excellent invoice preparation and printing program with instructions on how to modify it for your own business.

#113. LABEL MAKER 3
A collection of label programs to create mailing and disk envelopes, disk labels and much more!

#114. PANORAMA
A drawing and illustration program that compliments Graphx and TI Artist. A mu for the serious 99/4A artist!

#115. GRAPHICS DESIGN SYSTEM
A complete system for creating graphic screens in full color for your programs by J. Peter Hoddie. Fully documented.

#116. FOURTH TUTORIAL
A lesson in FORTH programming on how to create graphics.

#117. UNIVERSAL DISASSEMBLER
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.

#118. FAST TERM
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.

#119. RAG LINKER
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

#120. BITMAC
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!

#121. SUPER YAHTZEE & WHEEL II
If you like Yahtzee this disk is for you. A great version written in high speed assembly. Also included is another version of Wheel of Fortune which also lets you create your own puzzles with a puzzle edit program included.

#122. ADULT ADVENTURE
A trily adult adventure for use with the TI Adventure Module. Also included is a bonus adventure (not adult) "LOST GOLD" which is one of the better ones we have seen recently.

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ART OF ASSEMBLY—

(Continued from Page 19)

Next, we stash the starting value of R0, then move back one location and place an edge character on the screen. We then increment R0, add the length of the allowed string to it, and write another edge character. They are put there so our subroutine will easily be able to distinguish the two ends of the allowed input field. We also save this position of R0 (one beyond the last character to be accepted) for use later on. When operating in most modes, the edge character looks just like a space. This is not true when entering from E/A Option 3, in which case the edge character is a small square. You can redefine it to look like a space by:

LI R0,32*8+>800 Point at space character
LI R1,TEMSTR Use our temporary string buffer
LI R2,8 Eight bytes to read
BLWP @VMBR Read eight bytes from space
S R2,R0 Back up to edge character
BLWP @VMBW Write eight bytes

Finally in this opening section, we subtract R4 from R0 so we're at the first character spot in the field, then stash away the value in R4 for use later.

The section of code starting at CRSI0A is the main operating loop of this subroutine. The first order of business is to grab the character present at this spot on the screen and stash that at location ALTKEY. This will become the character that alternates with the cursor while the cursor is at this position.

The very next thing is to call the little subroutine CURFRC. CURFRC is there so that every time the cursor moves to a new input location, the cursor will appear on-screen, and start a new cycle of blinking. Were this not done, the cursor could become invisible after some of your keystrokes, and we find that disconcerting. Now we call the subroutine KI2 which simply keeps blinking the cursor, alternating with whatever character was there before, until you strike a key on the keyboard.

There are some checks now perormed on the value of the keystroke reported into R8 by KI2. The only one of these that's not immediately obvious is the check for the value 15. That's the ASCII code for Function-9, and be-haves the same as if ENTER were struck. In its application within the Golf Score Analyzer, the key combination Function-9 gets you back to the part of the program which called CRSIN, which then uses the fact that you exited CRSIN by Function-9 to escape gracefully from whatever function you were into. If you don't need that feature, you can omit the two lines CI R8,15 and JEQ CRSDMY.

We should at this point admit that this source code has not been subjected to a thorough "scrubdown" effort. The two lines following that compare to 15 and its jump instruction may be unnecessary. We're not going to stop and make that change in the program, but will leave as an excercise for the student the determination. As it is, the subroutine does work, even if it does contain a piece of sloppy coding. Your author is human, like you.

There's another piece of inelegant code in here, concerning label CRSDMY. That stands for DUMMY! During the development of this subroutine, we got into the situation where some of our jumps to label CRSIX were out of range. We

(See Page 25)

```
0135            MOV  R7,R0          GET R0 BACK AGAIN
0136  CRSD0     B    @CRSI0A        BRANCH BACK TO BEGINNING
0137  CRSIX     MOVB @ALTKEY,R1     WRITE CURRENT CHARACTER TO SCREEN
0138            BLWP @VSBW
0139            MOV  @ENDOC,R0      SET LIMIT POSITION IN R0
0140            DEC  R0             DECREMENT BY ONE
0141            MOV  @SAV4,R2       MOVE MAX NUMBER OF CHARACTERS INTO R2
0142  CRSIX1    BLWP @VSBR          READ THE CHARACTER AT CURRENT R0 POSITION
0143            CB   R1,@ANYKEY     IS THAT A SPACE?
0144            JNE  CRSIXX         IF NOT, WE'VE REACHED CONTENT OF STRING
0145            DEC  R0             ELSE MOVE BACK ONE SPOT
0146            DEC  R2             DECREASE CHARACTER COUNT BY ONE
0147            JGT  CRSIX1         IF GREATER THAN ZERO, JUMP BACK
0148  CRSIXX    MOV  @PGNUM,R0      GET ORIGINAL R0 POSITION BACK
0149            SWPB R2             PUT CHARACTER COUNT IN LEFT BYTE R2
0150            MOVB R2,@TEMSTR     PLACE THAT AT TEMSTR
0151            SWPB R2             REVERSE R2 AGAIN
0152            JEQ  CRIX           IF R2=0, JUMP
0153            LI   R1,TEMSTR+1    ELSE SET R1 TO POINT TO STRING CONTENT STORAGE
0154  CRSIX2    BLWP @VMBR          READ THE STRING FROM THE SCREEN
0155  CRIX      B    @SUBRET        RETURN FROM THIS SUBROUTINE
0156  *
0157  * SUBRET IS SHOWN HERE FOR REFERENCE.  NORMALLY IT'S MADE A PART OF THE FI
RST
0158  * HIGH-LEVEL SUBROUTINE USED IN THE PROGRAM
0159  *
0160  SUBRET DECT R15
0161         MOV  *R15,R11
0162         RT
0163  *
0164  * THE FOLLOWING SUBROUTINE GETS KEYSTROKES FROM THE KEYBOARD WHILE ALTERNA
TING
0165  * THE CURSOR WITH A CHARACTER STASHED AT ALTKEY
0166  * THE LINES LIMI 2 AND LIMI 0 ALLOW THE SENSING OF FUNCTION-QUIT AND ALSO
ALLOW
0167  * A BEEP VIA GPLLNK TO OPERATE PROPERLY
0168  *
0169  KI2     CLR  @STATUS        KEY-IN WITH ALTERNATING
0170            BLWP @KSCAN         CHARACTER AND CURSOR
0171            LIMI 2              ACTIVATE INTERRUPTS
0172            LIMI 0              SHUT OFF INTERRUPTS
0173            DEC  R4             ENTER AFTER R4 SET TO >0200
0174            JEQ  CHNG           AND R1 TO >1E00 AND VSBW
0175            CB   @ANYKEY,@STATUS HAS A KEY BEEN STRUCK?
0176            JNE  KI2            IF NOT, RE-SCAN KEYBOARD
0177            MOV  @KEYADR,R8     ELSE PUT KEY'S VALUE IN R8
0178            RT                  THEN RETURN
0179  CHNG      CI   R1,>1E00       IS R1 SET TO CURSOR CHARACTER?
0180            JEQ  L1             IF SO, JUMP
0181            LI   R1,>1E00       ELSE SET LEFT BYTE R1 TO CURSOR
0182            BLWP @VSBW          WRITE CURSOR TO SCREEN
0183            MOVB @ONOFF,R4      PLACE TIMING IN LEFT BYTE R4
0184            JMP  KI2            GO BACK TO SCANNING KEYBOARD
0185  L1        MOVB @ALTKEY,R1     PLACE ALTERNATING CHARACTER IN LEFT BYTE R1
0186            MOVB @ONOFF+1,R4    PLACE ALTERNATE DELAY IN LEFT BYTE R4
0187            BLWP @VSBW          WRITE CHARACTER TO SCREEN
0188            JMP  KI2            GO BACK TO SCANNING KEYBOARD
0189  *
0190  * THE FOLLOWING IS A SPECIAL KEY INPUT FOR REPEATING OPERATION OF
0191  * THE RIGHT AND LEFT ARROW KEYS
0192  * THIS SUBROUTINE INCLUDES SELF-MODIFYING CODE
0193  *
0194  KI2A    LI   R5,>0280       LOAD R5 WITH DELAY FACTOR
0195  KI2B    CLR  @STATUS        CLEAR GPL STATUS
0196            BLWP @KSCAN         SCAN KEYBOARD
0197            CB   @KEYVAL,@NOKEY  HAS NO KEY BEEN STRUCK?
0198            JEQ  KI2C           IF SO, JUMP
0199            LIMI 2              SET INTERRUPTS ON
0200            LIMI 0              SET INTERRUPTS OFF
0201            DEC  R5             DECREMENT DELAY COUNTER
0202            JNE  KI2B           IF NOT ZERO, SCAN AGAIN
0203            MOVB @ONE,@KI2A+2   ELSE MODIFY DELAY COUNT
0204  KI2C      RT                  THEN RETURN
0205  *
0206  * THE FOLLOWING SUBROUTINE FORCES THE CURSOR CHARACTER ONTO THE SCREEN
0207  *
0208  CURFRC  LI   R1,>1E00       PUT CURSOR CHARACTER IN LEFT BYTE R1
0209            LI   R4,>0100       SET DELAY FACTOR IN R4
0210            BLWP @VSBW          WRITE CURSOR TO SCREEN
0211            RT                  RETURN
0212  *
0213  * FOLLOWING SUBROUTINE CLEARS AN INPUT FIELD
0214  * BEGINNING AT R0 POSITION, EXTENDING NUMBER OF CHARACTERS IN R4
0215  *
0216  CLRFLD
0217            MOV  R4,R2          PLACE VALUE OF R4 IN R2
0218            MOV  R0,R3          SAVE R0
0219            MOVB @ANYKEY,R1     PUT SPACE CHARACTER IN LEFT BYTE OF R1
0220  CLRFL1    BLWP @VSBW          WRITE ONE SPACE IN FIELD
0221            INC  R0             POINT TO NEXT CHARACTER SPOT
0222            DEC  R2             DECREMENT COUNT OF SPACES
0223            JNE  CLRFL1         IF NOT ZERO, REPEAT WRITING OPERATION
0224            MOV  R3,R0          REPLACE ORIGINAL VALUE OF R0
```

ART OF ASSEMBLY—

(Continued from Page 24)

could have corrected that situation by adding labels, reversing logic, and including some B @CRSIX instructions. Instead, we wedged in that phony label CRSDMY, which simply makes a second jump to CRSIX. This is really not the soundest practice, but it's a quick, cheap, and ugly way out of a problem. We're not proud of it, but it does assemble and work correctly, so we're leaving it alone. Whenever your author starts to get too elegant with his programming, he remembers a lesson taught by his first mentor in programming the TI, a man named George R. Hendershot. The lesson was "First, get it to work!" One might add a corollary to that, such as "If it ain't broke, don't fix it!"

At label CRSC4, we see whether the insert key Function-2 has been struck. If it hasn't, we move on, and if it has, we set the insert flag (INSFLG) and go back to CRSI0. Once the insert key has been struck, characters entered from the keyboard will be inserted at the current cursor position until insert is cancelled by hitting the arrow keys, Function-9, or ENTER.

The next important keystroke the program looks for is ENTER. If that's been struck, we exit the subroutine. Given it's not the ENTER key, we check for Function-1. If that's been struck, we delete the character at the current cursor position and move all the characters right of that position in the field one spot left. Next there's one final check to see if some other key with an ASCII code less than the spacebar's 32 has been struck. If so, we ignore that keystroke.

Next there's a short section that converts lower case characters to upper case. This may be omitted if you don't need it.

At label CRSI1, we check to see whether the insert flag is set by moving that word into R1 and jumping ahead if the word was zero. If insert was in effect, we perform the steps between JEQ CRSI1A and the label CRSI1A. First, we write the character that was at the cursor position to the screen, then move our variable word ENDOC into R2 and subtract R0 from it. This makes R2 equal the number of characters between the current cursor position and the edge marker at the end of the field. Now we use TEMSTR, which will be the location for the string input when we're finished, as a temporary buffer

```
0225          RT                  RETURN
0226  *
0227  * REQUIRED DATA SECTION
0228  * THE FOLLOWING DATA SOURCE LINES ARE REQUIRED BY THESE SUBROUTINES
0229  *
0230  ONE     DATA 1
0231  ENDOC   DATA 0
0232  INSFLG DATA 0
0233  PGNUM   DATA 0
0234  SAV4    DATA 0
0235  ONOFF   DATA >0201
0236  EDGE    BYTE >1F
0237  ANYKEY BYTE >20
0238  NOKEY   BYTE >FF
0239  ALTKEY BYTE 0
0240  ENTERV BYTE 13
0241  RITEV   BYTE 9
0242  LEFTV   BYTE 8
0243  TEMSTR BSS  41
0244  * THE NUMBER IN THIS BSS MUST BE ONE MORE THAN THE LARGEST STRING LENGTH
0245  * EXPECTED IN THE PROGRAM'S EXECUTION
```

to hold all the characters from the cursor's position to the end of the field. We then DEC R2, so that the writing back of these characters will not extend to the edge character. If R2 has become zero, that means we're at the last position in the field, so we skip ahead. Now, we increment R0 so we're writing to the next screen spot, and perform a BLWP @VMBW to write the characters back to the screen one space to the right. Finally we decrement R0 so it points to where it was when we started this section of code, and then proceed at label CRSI1A to write the struck key's character to the screen.

Had we not been in insert, we would have jumped to here and put the character on the screen. After writing one character, we increment R0 so it points at the next spot, check to see if the character we've reached is an edge character, and jump back if it is, so we don't exceed the field limit.

The rest is pretty mundane stuff, simply handling the movement of the cursor in response to the arrow keys, so we'll skip ahead to CRSIX, where this string of characters gets "reported out" to the label TEMSTR.

The first order of business is to write back the ALTKEY character to the screen, then set R0 to point at the last spot in the field. Next, we get the field length from location SAV4 into R2. We now start examining the characters in the field in reverse order, looking for a non-space character, and decrementing the count in R2 each time we find a space. This eliminates trailing spaces from the length of the reported string. Once we've found a non-space, we have the length of the string in R2, so we swap the bytes in R2, place the length byte at location TEMSTR, re-swap so R2 has the length as a word value. At this point we check to see if a null string (all spaces) is in the field and get out of here if that's so. Otherwise we set R1 to point to TEMSTR+1, and read the string's content from the screen via a BLWP @VMBR.

When we finish, TEMSTR contains one byte at the beginning to indicate length of the string, plus the string's content. From here, the main program can take the string at TEMSTR and move it to the deired memory location via the small subroutine MOVSTR, which was included in Part 2 of this series.

As the saying goes, use it in good health. This subroutine can make your life a bit easier when you are writing a program. If it does that, in addition to adding to your knowledge of Assembly programming, then it's been worth the effort.

In our next article, we'll discuss, among other topics, the business of entering and returning gracefully from programs. We'll also discuss some of the ramifications of working with Assembly programs started from Extended BASIC.

READER TO READER

☐ Larry Topliffe, P.O. Box 967, Avon Park, FL 33825: Is it possible for you to mention that a new TI user would appreciate letters from experienced users explaining anything and everything, what books are good to get, etc? I don't know what GRAM Kracker is, Link, and many other things. I am not computer educated and have been picking things up as I go. (You may want to check out the MICROpendium Index for article titles. A GRAM Kramer is a device that allows you to save the contents of modules to disk. (Missing) Link is a program used to create graphics.—Ed.

☐ Larry Reeves, 622 S. Pine St., Mt. Pleasant, MI 48858: I have a TI Omni 800 printer, a 9-pin dot matrix with tractor feed, but there is no manual with it. I am wondering if anyone out there in TI Land has a printer like this and has the escape codes for things like underlining and subscripting. I would appreciate any help I can get on this.

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

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MIDI-Master 99

A musical masterpiece

By BRUCE HARRISON and DOLORES P. WERTHS

First, some clarification: Although many readers will recognize the authors of this review as the creators of Assembly music for the TI, we are not in any way in competition with Crystal Software's MIDI-Master. We are, however, in the unique position of having a team consisting of both a programmer and a musician, so we feel eminently qualified to evaluate this product from both a technical and musical perspective. Also, we have a Casio MIDI Keyboard with which to use the program.

First impression: This is an excellent piece of programming by a very talented programmer. Mike Maksimik has delved into the depths of the TI's capabilities and made it do things we didn't think possible. The program takes "source" files written in a special musical-oriented notation and compiles these into the necessary commands for a MIDI interface. It can also save the compiled music to disk, and can load pre-compiled works into memory for play through the MIDI device.

The currently available version is V2.3+, with a recent upgrade having been made. The package consists of two items: a very nicely made MIDI connection cable, which plugs into the RS-232 connector, and a single disk (DS/SD) which contains all the software and documentation. (If the user has only SS/SD drives, a single sided edition will be supplied upon request.) The program is set up to autoload from Extended BASIC, and may also be run from Editor/Assembler. Hardware required is TI-99/4A or Geneve, with E/A or XB, 32K, RS-232, and disk drive.

Documentation is extensive and well written. The only gripe we had about the documentation was that it required either Funnelweb or TI-Writer to print it out. Given either of those, however, printing was simple enough. We used Funnelweb's formatter and had no trouble printing the docs.

The program itself is menu-driven, and easy to use. Prompts and error reports are concise and clear, making this one of the more user-friendly programs we've seen.

Review

REPORT CARD

Performance .....A
Ease of Use.....A
Documentation .....A
Value ..... A
Final Grade.....A

Cost: $45.00
Manufacturer: Crystal Software, 635 Mackinaw, Calumet City, IL
Requirements: TI-99/A or Geneve 9640 with Disk Drive, XB or E/A module, RS-232 interface

A MONUMENTAL WORK

From a programmer's perspective, this program represents a monumental work. Mike has crammed what must be a very complex program into Low Memory only, so that all 24K of high memory is available for the music itself. He has also constructed a very efficient language for MIDI music.

Creating music source files for MIDI-Master does require an editor of the kind supplied with the E/A module, or one could use Funnelweb's Program Editor for that purpose. Music source files are written in a compact and easily learned language of Mike's devising, called Symbolic Note Format. The documentation includes a full description of this format, and it doesn't take long to master.

MIDI devices themselves come in many shapes and forms, and have different commands for the "instrument" selections. MIDI-Master has provided for this variation among devices in a number of ways. First, and most important, is the ability to establish a "Patch Library" so that works prepared for a different keyboard or synthesizer may be translated on the fly to work on the make and model you own. For those who have MIDI devices with more advanced capabilities, special DATA messages may be included in the source files to activate auto-rhythms and such, and to synchonize them with the music MIDI-Master is sending. (We haven't tried doing that with our Casio, but the capability is provided.)

For those, like us, who also have PC computers with MIDI interface and Twelve-Tone systems' Cakewalk software, the soon-to-be released version 3.0 of MIDI-Master will provide the capability to "port" MIDI files created by Cakewalk over to the TI and play them through MIDI-Master.

MUSICIAN'S POINT OF VIEW

MIDI-Master is very easy to use. The instructions are more than adequate. Best of all, at least for me, they are written in a musician's language rather than in "computerese". The computer-puke who is musically oriented would have little difficulty with the instructions, because most of the MIDI terminology is very clearly illustrated.

I did, however, find a discrepancy in the instruction regarding accidentals, that is, "sharps" and "flats" that occur throughout a composition. MIDI-Master's manual says to use a "#" for a sharped note, and " " for a flatted note." This is not so. When I used the space in order to make a flat, it did not work. I had to use its equivalent sharp instead. For instance where my score indicated had given the flat sign for B when the key signature indicated natural, I had to write it as A#. That was a minor annoyance, which was easily overcome.

I can appreciate the facility with which MIDI-Master's instructions read, because I had to struggle with Cakewalk's 172-page "easy to read" manual, most of which was written in "Computerese". However, I'm with Bruce — you should NOT have to have TI-Writer or Funnelweb with which to print the documentation. A simple Extended BASIC program will do the trick.

Take it from me. MIDI-Master has a great set of instructions! Let's face it, if you can't understand the instructions, how the heck can you expect to learn to use the product? I learned to used it in one day. In my opinion it shouldn't take any longer

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MIDI-MASTER 99—

(Continued from Page 28)

than a day or two to use any piece of software.

As yet, there is no provision for allowing a person to play the work into MIDI-Master. It must be programmed. I don't let that bother me, since I don't play the clavier very well anyway.

It is easy to use. I recommend marking each measure carefully with a comment line even though it takes up file space, because once you need to make corrections, it will be chaos trying to locate a mistake if you don't. Comment lines do not use any memory in your music. The compiler skips over them.

MANY CHANNELS AND VOICES

MIDI-Master can handle numerous channels and voices at once, but its capabilities are only as good as your clavier. You must remember that each instrument requires a separate channel. This is not unique to MIDI-Master, rather to the clavier you are using. If you have a MIDI-compatible Casio, then you are limited to 3 channels and a fourth channel which is supposed to be assigned to program changes for auto-rhythms. Casio's channel 1 handles 6 "voices", channel 2 handles 4 voices, and channel 3 handles 2 voices, so you must plan carefully before attempting to combine voices and instruments. Yamaha's new PSR-300 claims to be 28-note polyphonic, but I wouldn't know, since I don't own one.

Changing instruments and tempos on the fly is easy and fun to do with MIDI-Master. A simple "patch" or "tempo" directive placed ahead of where you want the change to occur in the data file and - Voila! It happens!

For instance, if you are playing an organ number which uses a regular pipe organ sound, then later requires you to draw the "flute" stops on the right hand, then you would tell the channel and track numbers representing the right hand to change from pipe organ to flute. The ones for the left hand might remain the same as before. The main drawback of all this is if you do chording. Each note requires a separate voice, unlike Cakewalk, and in order to keep each voice in sync, you must put in the required number of rests in the voice which may only have one or two notes because they are part of a chord. This is a real pain, and should be corrected in future updates. Each rest wastes two bytes.

MIDI-Master's biggest limitation appears to be that it has no way to make multiple files. Mike recommends TI-Writer's Formatter. Great. But, what if you don't have TI-Writer? You are then stuck with one very long file which takes for-bloody-ever to load and may not all fit in memory once it finally does stop loading. Bruce cured that problem for me by making a tool that allows me to make as many separate files as I wished, then combined them all as a single file on the disk. It takes only a few minutes to combine 6 or 7 files.

However, Mike promises that this problem will be solved in Version 3.0. In the meantime, Bruce gave a copy of our "tool" to Mike pass along to his customers who don't have TI-Writer. (We're told this tool is available from the Chicago Users' Group's BBS.)

MIDI-Master does allow the user to interpret most signs in any musical score. Trills, turns, appogiaturas, staccatos, dotted notes, ties, and triplets are all easy to execute. Slurs and legatos are another matter. You must use a tempo change in order to create the illusion of phrasing which is normally done with slurs and legatos. Some of this is possible in the data section by playing mathematical games with the ties, rests, and durations, but it will cost bytes. All I can say is see what works for you, and stick with it.

Da Capos are not possible with Version 2.3+, because it has no provisions for looping. I programmed a 16-measure military march with 6 parts with MIDI-Master. Each 8-measure section required a repeat. I had to replicate the data in order to follow the composer's instructions. You multiply those 8 measures times 2 for the first da Capo times another 2 for the next 8 measures which also must repeat, times 6, and a lot of memory is used up. Don't plan on doing Beethoven's Ninth with Version 2.3+.

Don't let this factor discourage you! This is a neat product!

It does everything it promises to do, and does not require an expensive clavier. In fact, if you have a Clavinova with 7 octaves, you'll be out of luck, because Version 2.3+ handles only the 5 octaves found on the garden variety clavier you found at K-Mart, Consumers, etc. Most MIDI-compatible Casio and Yamaha claviers of this type are moderately priced at $200 to $300.

I have pointed out MIDI-Master's drawbacks, but I have looked at it from a classical musician's viewpoint, and for me there is still a wealth of music out there which MIDI-Master can handle. Popular songs are easy to program, as are country-western, sacred music, and folk songs. There seems to be no end to the arrangements that are possible in these fields. It's all up to your imagination.

Mike Maksimik is one of those rare people who is both a talented musician as well as a programming genius. It is for this reason that MIDI-Master was possible.

Drawbacks exist on any program, and MIDI-Master is no exception. The principal ones have already been mentioned. One that hasn't been, although it's a minor annoyance, is the business of Barry Boone's loader. Maksimik chose to use that loader so the program could run from Extended BASIC. The gripe is that the docs suggest that the user should send a fairware contribution to Barry Boone. Perhaps I don't understand the fairware concept, but the user did not choose the Boone loader, and therefore should not be asked to contribute. When one has paid his $45 for MIDI-Master, that should be enough.

FREE UPGRADE TO V3.0

Potential users should know that for those who purchase Version 2.3, Crystal Software will throw in a free upgrade to Version 3.0 as soon as it's finished. As we understand what Mike is doing in Version 3, all of our gripes should go away.

In summary, MIDI-Master 99 is a truly fine program, with a few flaws, most of which should go away with the introduction of Version 3.0. If you have a TI or Geneve and a MIDI keyboard, this program is a must have.

MIDI-Master is the single most affordable MIDI anywhere at $45! It compares favorably to programs for PCs which cost more than three times that price. (Adding MIDI to our Tandy PC cost $250 for hardware and software.)

Wallstreet Analyst-Advisor

A program to take stock of

Review

REPORT CARD

Peformance ..... **A-**
Ease of Use ..... **B**
Documenation ..... **A**
Value ..... **A**
Final Grade ..... **A**

Cost: $40.00
Manufacturer: Program Innovators, 4122 Glenway, Wauwatosa, WI 53222
Requirements: TI99/4A, memory expansion, disk system, printer optional but recommended, Extended BASIC; or Geneve 9640

By JOHN KOLOEN

For small investors, the stock market can be a nightmare or a dream come true. Although money is name of the game, information is what you really need to play it. And lots of it. Not only do you have to know about balance sheets and profit and loss statements, but the small investor must be able to analyze a company's performance both 'from a fundamental and technical aspects. (Fundamentalists base their stock evaluations on balance sheets while technical investors pin their decisions on more arcane number crunching).

Investing, even small sums, requires a committment on the part of the investor to study the companies whose stock he purchases. It also behooves the stockholder to keep tabs on the company's fortunes, which often are reflected in the price of its stock. If a company is doing well, you know it because the value of the stock increases. When it does poorly, the value drops.

But putting together all the information is a daunting task, particularly for the small investor who lacks the expertise, the time and the resources of a brokerage. Still, there are computer programs that can provide support, and one of them for the TI is Wallstreet Analyst-Advisor from Program Innovators.

PERFORMANCE: Wallstreet Analyst consists of three SSSD disks that run out of Extended BASIC. I recommend copying all three disks to a single DSDD disk to eliminate disk switching. The disks contain a number of programs which provide the following capabilities:

Technical trend analysis
Portfolio management
Balance sheet analysis
Security statistical analysis
Market evaluation
Formula systems investing
Trend graphing
Contrarian investing

These options provide a wide range of information processing power for small investors, appealing to both fundamentalists and technical investors. Technical Trend Analysis, for example, would be useful to technical investors but not fundamentalists. Balance sheet analysis is aimed more at fundamentalists. But having the ability to do both technical and fundamental evaluations is quite handy, regardless of your investment approach.

There is no point in trying to describe how each segment of this program works, since the reader would have to have a fairly good understanding of investment principles to understand it. Nothwithstanding, here is what each of the above program segments does.

Technical trend analysis: Data from this is used by the market evaluation, trend graphing and formula systems segments. Trend analysis determines primary and current market trends and tracks them as data is added. The trends are filtered with "exponential smoothing," though an unfiltered moving average is included.

Portfolio management: This segment is used to keep track of the user's stock portfolio, or multiple portfolios. The program divides stocks and bond holdings into their security types and takes such data as the company name, stock type, symbol, number of shares, date purchased, amount paid, dividends, etc. This segment is used to regularly update stock values.

Balance sheet analysis: Users input data from a company's balance sheet and the program compares it to industry averages. The segment includes all 120 industries. Individual corporate files can be saved annually so that the user can com

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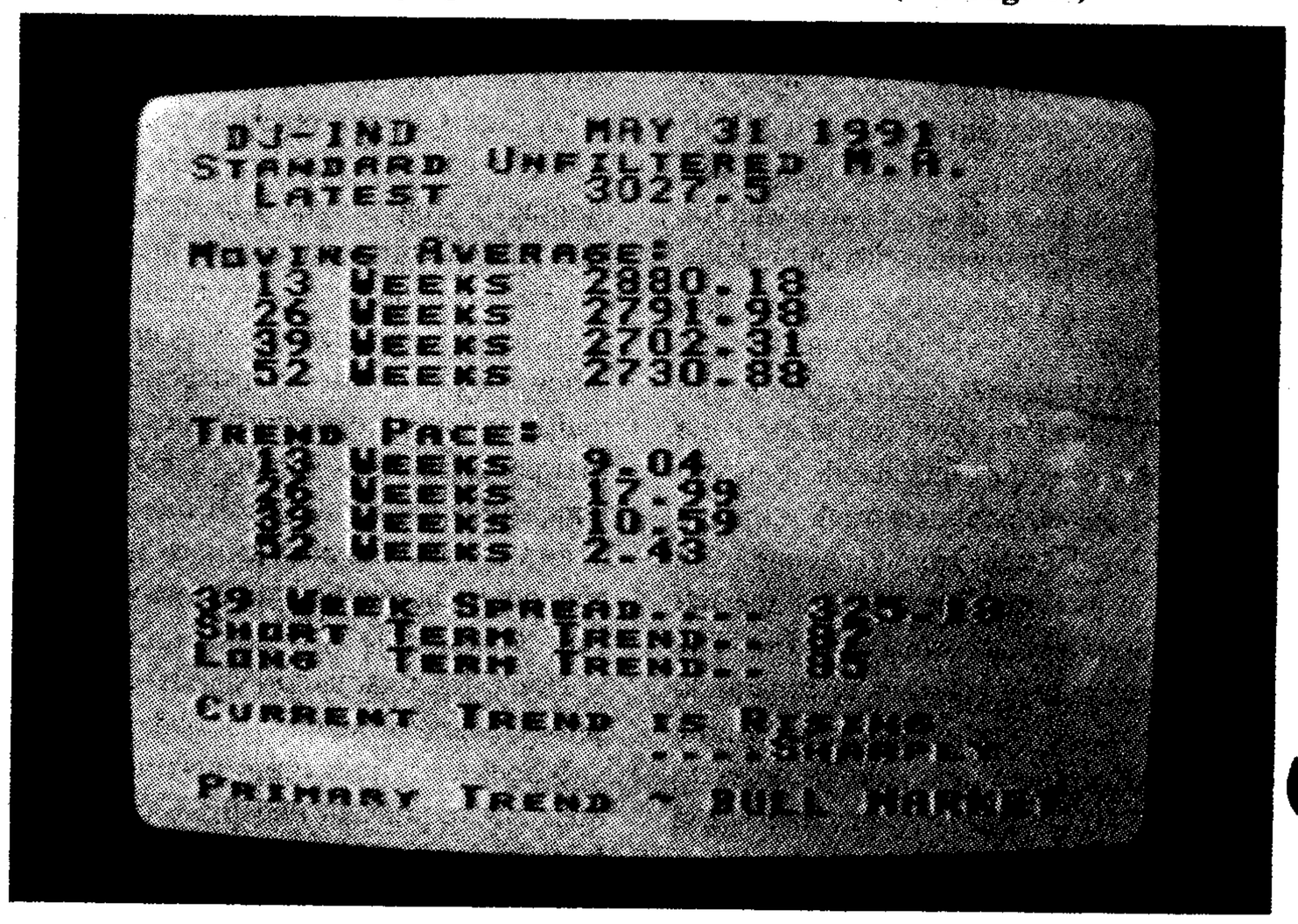

WALLSTREET ANALYST—

(Continued from Page 30)

pare a company's performance over time. Analysis includes solvency, efficiency and profitability.

Securities evaluation: This segment calculates yields, Price/Earnings ratios, volatility, risk and value, earnings rate of change, Alpha value and Beta coefficient, correlation coefficient, standard deviation and determination coefficient. This segment also determines the values of warrants, explores option leverages and evaluates debentures.

Market evaluation: The goal of this segment "is a realistic estimation of where the stock market is headed and how long it may take to get there." This is where most of the data input is done. Some information, taken from Barrons Weekly, is input on a monthly basis while other data is input on a weekly basis. Data that you input includes closing prices for the major market indices, trading activity for the markets, money supply, treasury bill rates, etc.

Formula system investing: This is for those who subscribe to the "efficient market," or Random Walk, theory. The major investment technique considered under this segment is dollar-cost averaging. The segment demonstrates how dollar cost averaging would perform based on the data from the Technical Trend Analysis segment. Other investment options that can be explored include straight line investment.

Trend Graphing: This segment prints a bit-map graph to the screen and printer. It takes data from the Technical Trend Analysis files and can include 156 data items, the equivalent of three years of weekly data items.

Contrarian investing: This segment lets the investor go against the crowd and invest contrary to the way in which most people invest. Options that can be tested for include price, yeild, book value, P/E ratio, sales and media prognosis. There is a price momentum test as well. Up to 20 stocks can be evaluated through this segment at a time. The program also tablulates ranks of these stocks.

Additional features of the program include help screens available from the main menu (these essentially reproduce information from the documentation) and a choice of outputting data to screen or printer throughout. The program is designed for use with Epson-compatible printers, though the program is not protected and printer codes can be modified by knowledgeable users.

Drawbacks to the program are that there is very little error trapping and making a mistake may stop the program and require the user to go back to the beginning of the segment to start over. Where an error in data entry is made, in the Portfolio Management segment, for example, you must go back to the main segment menu and then go back to the data entry screen to correct it. This is inefficient, but workable. Graphically, the program's screen are straightforward, with little embellishment.

I ran the program both on a Geneve and 99/4A. The program ran considerably faster on the Geneve, but other than that there was no difference.

EASE OF USE: This is not an easy program to use. It requires a committment on the part of the user to make it work properly. I would assume that anyone who buys it is either an investor or is interested in investing. Users must not only make a thorough reading of the manual but must be familiar with basic investment concepts.

DOCUMENTATION: The manual contains a lot of information useful to investors, particularly those who are not as sophisticated as brokers. It defines concepts very well and is literate without being wordy.

VALUE: Virtually anyone who is interested in stocks or bonds from the standpoint of investing may benefit from Wallstreet Analyst. It is a very sophisticated program with enormous data processing capability. Frankly, I'm surprised it was done in Extended BASIC for the TI99/4A. Aside from shortcomings in error trapping, I am very impressed by the author's (Gene Hitz) programming and securities expertise. (The A- grade under Performance is due only to the error trapping problem.)

MICRO-REVIEWS

A good place to turn to for CorComp repairs

By STAN KRAJEWSKI

Welcome back for another installment of MICRO-reviews, although this month's offering will be condensed. I have a shortage of the latest software to review, as I don't want to repeat any program that has been reviewed in the past in this column. I just wanted to let you know that if there is a month that this column doesn't appear it is because of this situation.

When MICRO-reviews first started in October 1988, it was with the intent of recognizing new programmers and keeping readers informed about new fairware and commercial software. This is still necessary, and I also would like to add comments from time to time letting others know about my computing experiences, good or bad. This can also serve as a promotion for programers who cannot afford to advertise or have a commercial company carry their product.

Ratings for the software reviewed in this column are based on a star system, as follows.

★ Leave it alone, back to the drawing board.

★★ Needs improvements, but workable.

★★★ A good program, worth trying.

★★★★ Send your money and buy it.

★ ★ ★ ★

99 Computer Repair

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MICRO-REVIEWS—

(Continued from Page 31)

I have sent my CorComp 9900 Micro-Expansion System in for repairs about four times in the past 18 months. If anyone can say anything about this company, 99 Computer Repair, I think I have the experience.

I have continually had problems running any program using my system connected to 9900 micro system. I would get the unit back and insist that that the unit was defective. I got it back several times, tested and parts replaced. I got it back the last time with the entire chassis replaced. However I did fail to include the power supply with the unit when I sent it in, and the problem may have been with it. I knew that could be the only thing left as I tried different consoles, cartridges and repaired units. This leaves a lesson — when sending any peripheral in for repair, send the entire unit, including the power supply.

This company has tried to satisfy me from the first time I sent it in until I got the system running. In the past CorComp serviced its own products. Now all CorComp products are sent to 99 Computer Repair, 2101 West Crescent Ave. Unit B, Anaheim, Ca 92801. Call 718-539-4834 for RMA number before sending. When returning an item for out of warranty repair. return the product with a check or money order for $50. This will cover the cost of any repair the product needs. A detailed description with the problem will also help. All items will receive a 120-day limited warranty.

★★

4-WHEELIN'

This is a program that had good intentions but didn't quit turn out. System requirements are disk drive, 32K, Extended BASIC and a joystick.

4-Wheelin' is a one player game where you are a monster truck out to beat the computer-operated truck through a mass of other vehicles. The object of the game is to get to the finish line first so you can earn another truck and go to the next level. Your lives, score, level and distance are displayed on the right side of the screen.

The reason I gave two stars is that the level of difficulty is high enough to make the game a bit of a challenge. However, the sounds are annoying and sound as if the console is malfunctioning. The graphics are better than some but there are flaws as they jump around the screen instead of flowing smoothly. Also, when the computer truck is crashed into it remains partially on the screen as a new one is generated.

The game operates at a decent speed at restart and is easy to continue with a press of the joystick button. This comes in handy as you will find yourself restarting quite often and do not have to reach for the keyboard.

The programming expertise is obvious but the program could have benefitted from a longer stay on the drawing board. This game is suitable for younger members of the household for the price as is. The adult might want to take a go at it. To order send $4 plus $1.50 S&H to: Baker Software, 8301 Stevenson Ave., Sacramento Ca. 95828.

If you would like your products reviewed in this column, send them to Stan Krajewski, Route 6 Box 568-15, Live Oak, FL 32060. Included return mailer and postage if you would like them returned.

Newsbytes

UK users to meet

The 1992 annual group meeting of the TI99/4A Users Group (U.K.) is scheduled May 16 at Princess Anne Training Centre, 10 Trinity St., Derby, Derbyshire, England.

According to Stephen Shaw of the group, Trinity Street is opposite the Derby Royal Infirmary, and the location is within easy walking distance of rail and bus stations and a car park is nearby at the end of the street.

For further information, write Shaw at 10 Alstone Rd., Stockport, Cheshire, England SK4 5AH.

Asgard announces new hours, products

Asgard Software has announced new hours of operation and released LinEditor, a tesxt editing program and the Asgard Mouse Developers Package.

According to Chris Bobbitt of Asgard, orders and inquiries about product prices and availability may be made by calling (703) 255-3085 10 a.m.-5 p.m. eastern standard time Monday-Saturday and noon-6 p.m. Sunday every day except Christmas and New Years.

For technical information, call 7 p.m.-10 p.m. Monday-Friday or noon-6 p.m. weekends to the same number, except Christmas and New Years.

Order status questions should be made to (716) 778-9104, 9 a.m.-5 p.m. Monday-Friday.

Asgard has released LinEditor for the TI99/4A and Geneve 9640 which is designed to allow the user to load and edit a test file larger than can be fitted into the computer's memory.

The program by Edwin Hall loads from TI-Writer, Editor or Extended BASIC and has a built-in help screen. It uses many of

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the same keys as TI-Writer, according to the manufacturer.

LinEditor requires a TI99/4A with expanded memory and a disk system. It is compatible with the Hard and Floppy Disk Controller and RAMdisks. Price is $14.95 plus $3 shipping and handling ($5 airmail).

The Mouse Development Package contains extensively documented routines, with source code, for assembly, c99, Fortran 99/9640 and Extended BASIC programmers, according to the manufacturer. Support routines are also provided for reading a 9938 mouse within programs on a 4A or a Geneve. The manufacturer says that users can use the routines can create device-independent programs that take advantage of both the Asgard Mouse and the Myarc Mouse on both the TI99/4A and the Geneve.

The package requires an Asgard Mouse and either Extended BASIC, Editor/Assembler or the Fortran 99/9640 or c99 compilers and the appropriate hardware to run them. The suggested retail price is $14.95 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. Asgard also has a new 12-page entertainment catalog available free by mail or phone request.

Digital sound from OPA

OPA is marketing Don O'Neil's Digi-Port digital sound adapter and player for the TI99/4A and the Geneve 9640.

The device consists of a cable that plugs into the parallel port of most RS232 cards (TI, Myarc or CorComp) and allows the users to play 8-bit digitized sounds. Software provided with the cable allows playback of sounds from zero Khz to 80 Khz either through the cable or through the 4A's built-in 9919 sound generator. According to OPA, the 9919 plays sounds at 5-bit accuracy while the cable plays at 8 bits. The system does not allow the user to create digital sounds.

According to OPA, a standard TI99/4A the user can play sounds that last up to 10 seconds at 5 Khz. Those who also have a Super Cart, 80-column card, Rambo memory card, 4A MEMEX card or a Geneve can player longer sounds, up to 10 minutes.

Included in the package are a parallel adapter cable, which requires an external amplifier to hear sound; one program disk with Digi-Port software; one of the following disk configurations, depending on the buyer's drive and memory capacity, 10 SSSD disks containing 24K or smaller sound files for a standard 99/4A; 10 DSSD disks containing 112K or smaller sound files for use with a 99/4A with 80-column card; or 10 DSDD disks containing 360K or smaller sound files for use with a 99/4A equipped with MEMEX, Rambo, or a Geneve; or 10 DSQD disks containing 720K or smaller sound files for use with a 99/4A equipped with a MEMEX or Rambo, or a Geneve.

The Digi-Port system is priced at $39.95 (U.S. funds). For information, contact OPA, 432 Jarvis St. Suite 501-502, Toronto, Ontario Canada M4Y-2H3; 416-963-8484.

Texaments offers new catalog

Texaments has released its fall/winter catalog for the TI99/4A. The catalog is free to anyone who requests it.

The new catalog features several new products and reduces prices on other packages, according to Steve Lamberti, Texaments president. Among the new releases is Sound F/X by Barry Boone, which works on the 99/4A and Geneve. Several Geneve games are also among the new releases.

Call or write the company to obtain a catalog: Texaments, 53 Center St., Patchogue, NY 11772; 516-475-3480; BBS 516-475-6463.

Gen-Tri V1.02 now shipping

Version 1.02 of Gen-Tri began shipping on October 3, according to Jerry Coffey, distributor for JP Software products. Version 1.02 includes a spellchecker as well as several changes in response to bug reports from initial users, including:

- Correction of the Macro function of the word processor to perform as designed;
- Correction of the handling of blank lines by the reformat command in the word

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Feedback

(Continued from Page 7)

available from Bud Mills Services. (See his ad elsewhere in this edition.)

A RAMdisk is like an electronic floppy disk, and functions at a must faster speed when reading and writing files to it. A RAMdisk is a card that fits into the Peripheral Expansion Box. The Horizon RAMdisk is the best known and is sold by Bud Mills Services.

A hard disk is like having hundreds of floppy disks on a single drive and requires a Myarc Hard & Floppy Disk Controller to work on the TI or Geneve. No, the original TI monitor does not sup-port 80 columns.

MICROpendium has published numerous articles concerning the questions you ask. Among them are the following editions: March 1985, September 1988, April and May 1990. We published a series about expanding a basic system from October 1989 through May 1990 that answered many questions about hardware for the TI, including questions about disk drives, RAMdisks, GRAM devices and monitors.

The Feedback column is a forum for TI99/4A and Geneve users. The editor will condense submissions where 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.

Software for TI and Geneve to debut at Chicago fair

A number of new products are debuting at the Chicago TI International World Faire Nov. 2 at the Elk Grove Holiday Inn in Elk Grove Village, Illinois, according to Hal Shanafield of the Chicago TI Users Group, host group for the event.

He says he expects the faire to be "a little larger than last year" and notes that the space for the event is also somewhat larger.

The faire is part of a weekend which includes the Milwaukee TI Faire Nov. 3 at the Quality Inn in Milwaukee, Wisconsin.

Products scheduled to appear at the faire include:

• Geme and the Pascal system for the Geneve 9640, presented by Beery Miller. The P-system, which Miller says Lou Phillips of Myarc has given him permission to distribute, requires a DS/DD drive system minimally to run. Miller says the P-system library files engulf an entire 360K disk and the run time file demands the use of the library files.

Miller provides the disks for $10 and can be contacted at P.O. Box 752465, Memphis, TN 38175-2465.

• Midi Master 99 V3.0 by Mike Maksimik. In this version, users can create a file directly from a keyboard.

• TI Casino V3.0 by Ken Gilliland.

• Scud Buster and Code Breaker by Harrison Software, presented by Bruce Harrison. Shanafield says Code Breaker is a cryptogram program which allows encrypting or decrypting of a program by one or two players. It contains 380 already formed cryptograms which can be made harder or easier. In the hard version, all messages are clustered in five character groups in which there may be some "padding" characters.

• Digitized sound chip from Texaments, presented by Barry Boone.

• New hardware from Bud Mills and Gary Bowser.

Presentations are also scheduled from Don Shorock, creator of a great deal of language teaching software for the TI, and from Barry Traver of the Genial TRAVelER diskazine.

Beery Miller will be presenting an informal Geneve Programmer's Conference from 9 a.m. until noon Nov. 1 in the Chicago Users Group hospitality suite at the faire. The meeting is free of charge, and Miller says it will provide an opportunity for "programmers and those interested in MDOS programming to discuss tricks, ideas, concepts to allow one to take full advantage of the Geneve."

A social mixer will be held the evening of Nov. 1 and a banquet the evening of Nov. 2. At the banquet, the John Birdwell Memorial Prize will be presented by the trustees of the John Birdwell Memorial Fund. Shanafield says the Chicago User Group does not present the prize or administer the fund, though it does collect contributions for the fund.

Don Walden of the Milwaukee TI Users Group says invitations to the Milwaukee Fair this year have been extended to groups for other "orphan" or "classic" computers besides the TI, such as Timex and Commodore.

He notes that these computers are now using a lot of the same data files as the TI now and also a lot of the same IBM type equipment. Walden says he expects most of the vendors from Chicago to be at the Milwaukee Faire and that a number of door prizes will be presented.

For information on the Chicago Faire, call (708) 864-8644. For information on the Milwaukee Faire, call (414) 535-0133.

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processor;

• Addition of the ESCape character to those that can be passed to the remote host in terminal mode;

• Addition of delay loops to the YMODEM routines to offset the slow performance of some clones (direct transfers now work up to 19,200 baud);

• A temporary fix for a directory bug on very large program files;

• Improved Find and Replace functions.

The spellchecker's standard dictionary contains 30,000 words in a compacted 718-sector file. It expands to three times this size when uncompressed. A utility program is included to allow users to add words to the dictionary in the efficient coded form developed by Wayne Stith.

According to Coffey, the spellchecker can check a single word in a document in a fraction of a second. When checking an entire document, words not found in the dictionary are highlighted and the user has the option to ignore them or add them to the dictionary. The dictionary takes up an entire DSSD disk, but Stith will abbreviate it and place it on a SSSD disk upon request.

To order Gen-Tri, send $49.95 to Jerry Coffey, 9119 Tetterton Ave., Vienna, VA 22182. To upgrade to V1.02, send your original program disk and $1 for postage to Coffey. In either case, indicate when your system can handle DSDS (1440 sector) disks. Otherwise it will be shipped on DSSD (720 sector) disks. SSSD disks require a special order because of the size of the dictionary.

Eicher not the author

Daniel Eicher is not the author of GOFER by Asgard Software. Eicher's name was mentioned as the author in a newsbyte in the September edition.

Want to reach thousands of TI users without paying a dime? Send information about your products and services to MICROpendium Newsbytes, P.O. Box 1343, Round Rock, TX 78680.

Comments

ESD shows glimpse of hard drive controller

Chicago's TI fair is just around the corner, Nov. 2, and I'm looking forward to it. Every TI user should make a point of attending at least one fair a year, whether in Chicago or anywhere else. I've never been disappointed. No matter what my expectations have been prior to attending a fair, they are always exceeded either through the camaraderie or discovering some new piece of software or hardware that I never knew existed. See you at the fair.

ESD UPDATE

Apparently members of the MANNERS user group in Maryland saw a demo of the ESD hard drive controller in September. Two versions were shown: the original hard and floppy controller design for MFM drives and a newer hard drive controller for IDE drives. Apparently, the controller will be sold with a hard drive. Also mentioned was a high density floppy controller that will handle 1.2 megabyte 5.25-inch drives as well as 1.44 megabyte 3.5-inch drives. However, this card may have problems dealing with older floppy drives and formats. The demo consisted of writing and reading a block of data, so it's not what you would call operational in a meaningful sense. Since the CRU addresses may be designated by the user, these controllers can be configured to reside simultaneously with the Myarc HFDC and TI, CorComp or Myarc floppy controller.

Tentative pricing is $279 for the IDE hard drive controller with IDE drive, which sounds like an exceptional value; $139 for the hard drive controller alone; $165 for the high density floppy controller with floppy drive; and $97 for the high density controller alone. Availability may be as soon as the February 1992 Fest West.

PASCAL FOR THE GENEVE

It is beginning to look as if Myarc will not be providing a finished version of Pascal Runtime. Beery Miller of 9640 News says he has been granted permission of Lou Phillips of Myarc to distribute the current version of the P system. The system requires DSDD drives. According to Miller: "This is not the finished product, but will probably be the only product we get from Myarc." Miller will provide the program, on two DSDD disks, for $10. Contact Beery at P.O. Box 752465, Memphis, TN 38175. The Pascal files also may become available on Delphi. They are over 1,400 sectors long.

I wrote last month that repairs on HFDC and Geneve's were beginning to move along. I got this information from a reliable source. However, I'm still sitting here without my HFDC. I sent it in May. Yes, I am very disappointed.

—JK

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) 233-0790.

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

More on printing double columns

This comes from Sam Carey, of Portland, Oregon. He writes:

In the May 1991 User Notes (Double column text formatter), if any of the input (D/V80) file's lines are more than 40 characters in length, the program will crash. In order to fix it, change line numbers 5-7 to:

```
5 IF EOF(1) THEN 8 ELSE R=R+1 :: LINPUT #1:IN$(R)
6 IF LEN(IN$(R))>40 THEN IN$(R)=SEG$(IN$(R),1,40)
7 IN$(R)=IN$(R)&RPT$(" ",40-LEN(IN$(R))) :: DISPLAY IN$(R):: GOTO 5
```

Of course, this will cut off whatever was on the second half of the line. If you want to print out a letter with this program, load the letter into TI-Writer, set the left tab to 2 and the right tab to 38. Reformat each paragraph with CTRL-2. Save the file, and run it through this program.

Multiplan sorts

This comes from Dennis F. Splett, president of the Kitsap 99ers of Bremerton, Washington. He writes:

The object was to find the lowest priced 2400 baud modem with the features we wanted, but there were several hundred ads in Computer Shopper and trying to keep all that in your head can make a man crazy.

So we set up a spreadsheet using Multiplan with columns for baud rate, brand name, price, page number where the ad appeared and features. The data from each ad was entered on one line as we came to it. The example below is a recreation of the original work just to demonstrate the point. The columns with page numbers and features have been omitted as they add nothing to the demonstration.

1200	BETA	$40.00
9600	BETA	$385.00
1200	GAMMA	$39.50
2400	DELTA	$99.00
1200	DELTA	$45.00
2400	BETA	$85.00
9600	DELTA	$375.00
2400	GAMMA	$105.00
1200	BETA	$39.00
300	DELTA	$15.00
300	GAMMA	$8.00
300	BETA	$20.00

The above three columns are as the data was entered, one line at a time in random order. Each line represents the data from one dad, baud rate, brand name and price. The goal is to develop a table with ascending baud rates, ascending alphabetic order for brand, and ascending value for price within each brand.

300	GAMMA	$8.00
300	DELTA	$15.00
300	BETA	$20.00
1200	BETA	$39.00
1200	GAMMA	$39.50
1200	BETA	$40.00
1200	DELTA	$45.00
2400	BETA	$85.00
2400	DELTA	$99.00
2400	GAMMA	$105.00
9600	DELTA	$375.00
9600	BETA	$385.00

Above is the file sorted on column 3 (price). The apparent sorting of column 1 is coincidental because of the large differences in cost between baud rate groups.

300	BETA	$20.00
1200	BETA	$39.00
1200	BETA	$40.00
2400	BETA	$85.00
9600	BETA	$385.00
300	DELTA	$15.00
1200	DELTA	$45.00
2400	DELTA	$99.00
9600	DELTA	$375.00
300	GAMMA	$8.00
1200	GAMMA	$39.05
2400	GAMMA	$105.00

Above is the file sorted on column 2 (brand name). As the computer searched for a "B" the first one it found wsa the one associated with the lowest price so it moved that line to the tope of the list. Again, column 1 appears sorted because of the price distinctions between baud rate groups. The next highest priced "B" is then found, and so on through the alphabet.

(See Page 37)

Boone to debut Sound F/X and 10 Geneve games at Chicago TI fair

Barry Boone, in conjunction with Texaments, will be introducing ten games for the Geneve at the Chicago TI fair, as well as his Sound F/X digital sound player.

The Sound F/X program will sell for $14.95. Companion disks with a variety of sound files will be available for $2.95 for a package of two.

Boone says the Sound F/X program "takes advantage of all memory devices available to the 99/4A or Geneve." These include memory cards, Super Space and 80-column cards. The more memory available, the larger the sound files that can be loaded. The program tells how much buffer space is available. With a 4A with 32K memory expansion, there is enough sound playing space to handle a 34K sound file.

In addition, a conversion utility that comes with the program allows users to download sound files from PC and Macintosh bulletin boards and automatically convert them for use on the 99/4A or Geneve.

Sound F/X also allows users to make resolution adjustments to sound files. Although the 4A is capable of handling files that run at up to 11 kilohertz, and most sound files are designed for use at 11 kilohertz, some files may have 22Khz resolution. The program adjusts these faster files to run at 11 kilohertz.

The program is menu driven and requires no additional hardware, aside from the TI or Geneve. It is also hard disk compatible.

A related product in the works is called F/X Slide Show, which displays pictures from TI-Artist or My-Art while sound files are playing. This product may be available as early as January 1992, depending on the success of Sound F/X.

Boone will also be introducing ten games for the Geneve at the Chicago TI fair. Among the titles are Jungle Terror, Time Guardian, Train Twister and Scrambler.

User Notes

(Continued from Page 36)

300	BETA	$20.00
300	DELTA	$15.00
300	GAMMA	$8.00
1200	BETA	$39.00
1200	BETA	$40.00
1200	DELTA	$45.00
1200	GAMMA	$39.50
2400	BETA	$85.00
2400	DELTA	$99.00
2400	GAMMA	$105.00
9600	BETA	$385.00
9600	DELTA	$375.00

Above, the final sort is on column 1. Here we have all the 300 baud modems by BETA in ascending price, then DELTA and GAMMA.

The one place in this small sample where the result is most evident is in the 1200 baud BETA — $39.00 and $40.00.

This little exercise was a revelation to me because I have never seen anything like this capability discussed or explained before. It may someday be of use to you, or it may stimulate you to discover something else that you did not know before.

Can't pass up a challenge

This comes from Jim Peterson, of Tigercub Software. He writes:

In his remarks concerning his Table program in MICROpendium, Jerry Stern mentioned that it would be difficult to write a program which would accept an equation as an input and use it to solve problems, and that such a program would be very slow. Such a challenge could not be ignored!

This one works by converting the input into tokenized program format and then overwriting it into the last line of the program as a GOSUB.

```
100 DISPLAY AT(3,3)ERASE ALL
:"PROGRAMMABLE CALCULATOR":"
":"      by Jim Peterson" !21
0
110 DISPLAY AT(7,1):" Input
 any mathematical    formula
 in the form of a    valid B
ASIC statement, usingA for t
he value to be calcu-" !112
120 DISPLAY AT(11,1):"lated
and B thru F for the  values
 to be input.":" Examples -
 ":"   A=(B-C)^D-7":"   A=B-
C+C*.1-C*.0575":"   A=INT(AB
S(B-C))-PI" !108
130 DISPLAY AT(19,1):" To c
hange the formula,    enter
```

(See Page 38)

User Notes

(Continued from Page 37)

```
0 for all values." !071
140 DISPLAY AT(24,7):"PRESS
ANY KEY" :: DISPLAY AT(24,7)
:"press any key" :: CALL KEY
(0,K,S):: IF S=0 THEN 140 EL
SE CALL HCHAR(7,1,32,18*32)!
107
150 A$="" :: DISPLAY AT(8,1)
:"FORMULA?" :: ACCEPT AT(10,
1):F$ :: ON WARNING NEXT !19
7
160 DATA ),182,(,183,=,190,+
,193,-,194,*,195,/,196,^,197
,ABS,203,ATN,204,COS,205,EXP
,206,INT,207,LOG,208 !006
170 DATA SGN,209,SIN,210,SQR
,211,TAN,212,PI,221 !251
180 RESTORE 160 :: FOR J=1 T
O 19 :: READ X$,W !145
190 P=POS(F$,X$,1):: IF P<>0
 THEN F$=SEG$(F$,1,P-1)&CHR$
(W)&SEG$(F$,P+LEN(X$),255)::
 GOTO 190 !063
200 NEXT J :: J=0 !099
210 IF J=LEN(F$)THEN 240 ::
J=J+1 :: Z$=SEG$(F$,J,1):: I
F POS("-.0123456789",Z$,1)=0
 THEN A$=A$&Z$ :: GOTO 210 !
116
220 N$=N$&Z$ :: IF J=LEN(F$)
THEN 230 :: J=J+1 :: Z$=SEG$
(F$,J,1):: IF POS("-.0123456
789",Z$,1)<>0 THEN 220 !201
230 A$=A$&CHR$(200)&CHR$(LEN
(N$))&N$&Z$ :: N$="" :: GOTO
 210 !011
240 A$=A$&CHR$(130)&CHR$(136
)&CHR$(0):: GOSUB 330 :: CAL
L HCHAR(12,1,32,250)!227
250 W=0 :: IF POS(A$,"B",1)<
>0 THEN DISPLAY AT(12,1):"B=
?" :: ACCEPT AT(12,5):B :: W
=W+B !176
260 IF POS(A$,"C",1)<>0 THEN
 DISPLAY AT(13,1):"C=?" :: A
CCEPT AT(13,5):C :: W=W+C !0
38
270 IF POS(A$,"D",1)<>0 THEN
 DISPLAY AT(14,1):"D=?" :: A
CCEPT AT(14,5):D :: W=W+D !0
44
280 IF POS(A$,"E",1)<>0 THEN
 DISPLAY AT(15,1):"E=?" :: A
CCEPT AT(15,5):E :: W=W+E !0
50
290 IF POS(A$,"F",1)<>0 THEN
 DISPLAY AT(16,1):"F=?" :: A
CCEPT AT(16,5):F :: W=W+F !0
56
300 ON ERROR 310 :: GOTO 320
 !082
310 CALL SOUND(400,110,0,-4,
0):: DISPLAY AT(12,1):RPT$("
 ",250):: DISPLAY AT(24,5):"
INVALID FORMULA" :: RETURN 1
50 !135
320 IF W=0 THEN 150 :: GOSUB
 350 :: DISPLAY AT(18,1):"A=
";A :: GOTO 250 !239
330 CALL PEEK(-31952,A,B)::
CALL PEEK(A*256+B-65534,A,B)
:: C=A*256+B-65534 :: CALL L
OAD(C,LEN(A$))!127
340 FOR J=1 TO LEN(A$):: CAL
L LOAD(C+J-3,ASC(SEG$(A$,J,1
))):: NEXT J :: CALL LOAD(C+
J-3,0):: RETURN !086
350 !**********************
!031
```

TI-Base repeat character function

This comes from Bill Gaskill, of Grand Junction, Colorado. He writes:

One of the less obvious enhancements built into TI-Base version 3.0 is a repeat character function much like the RPT$ command used in Extended Basic. Repeat character is invoked by placing the character that is to be repeated in a set of parentheses and telling the TI-Base interpreter how many times to repeat it. As an example, you could display 20 dollar signs by entering;

DISPLAY (20$)

at the dot prompt. The number 20 is of course the number of repetitions desired, and the dollar sign is the character to be repeated.

Using the same technique, you could also clear the screen by placing a blank space where the $ sign is and repeating the operation enough times to fill a 24 row by 40 column screen with blank spaces.

The limitation on repeat character is 127 repetitions per command. So each command of (127) would clear up to 3 lines of the screen. This means that eight commands would be needed to get the job done.

XB lockups

This item appeared in Chicago Times, the newsletter of the Chicago TI99/4A User Group. It was written by Owen Mayer.

If you are still having problems with Extended BASIC lockups, try the following. Many consoles have excess lubricant in felt in the cartridge port. Removing the felt requires taking apart the console. You can remove excess lubricant by cutting a 3x5-inch index card lengthwise so that it is 1 13/16 by 5 inches. Fold it over and insert it into the cartridge port and leave overnight. Each time you repeat this, some lubricant will soak into the card. The lubricant interfers with the operation of the XB module the most. If your modules or widget have it on their contacts, TV tuner cleaner without lubricant is effective at removing it

I had some improvement after doing this, and I have had more improvement by taking apart my widgets and resoldering all the connections inside. Have a good assortment of small screws on hand as the original strip easily.

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