Covering the TI99/4A and the Myarc 9640

MICROpendium

Volume 8 Number 6 July 1991 $2.50

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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.

Comments

A 12 Mhz TI!

If speed is what you've dreamed about, then mark July 1991 on your calendar. This month marks the scheduled debut of Don O'Neil's accelerator for the TI. This extraordinary device mounts directly into the console, requires no soldering and turns your TI coupe into a Ferrari. All for $250.

The device will be available through Bud Mills Services and OPA. And it looks like just the beginning of a number of peripheral devices that combined will turn the TI into an entirely new computer. The next thing up is a new interface card between the TI console and the PEB, which is expected to debut about the time of the Chicago TI Faire. In addition to connecting the two pieces of equipment, this card has a 16-bit bus with room for up to 8 megabytes of RAMBO DRAM and 16-bit slot for future expansion, which O'Neil says will most likely be used for a 9978-based video card.

And then, there is also a potential for development of emulators for MDOS, MSDOS, CP/M and Apple II. Gary Bowser of OPA is working on a Z80 emulator that may be used to port software from Sega and Sega Genesis systems.

What it looks like is that the accelerated TI will be giving the Geneve a run for its money. (See articles on page 26.)

TWO COLUMNS END

I'd just like to thank Harry Brashear and Bill Gaskill for their long-running columns that come to an end this month. Harry's MICRO-Reviews and Bill's TI-Base tutorial series won't be appearing anymore. Thanks guys, you did well.

Geneve owners may notice that Jim Uzzell's Myarc BASIC column was left out of this edition. No, Jim hasn't given up. His Geneve died and he's waiting for Myarc to repair it. He ran it constantly for four years, seldom turning it off. Four years sounds like a good run for a machine that frequently ran 24 hours a day, day after day, week after week.

—JK

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Feedback

A license to compute, and praise to Rave 99

This letter is dealing with two subjects. The first is the enclosed picture. It is a picture of the license plate I had when I lived in Sheboygan, Wisconsin. Now that I live in Tucson, Arizona, which uses only the rear plate, I use my old TI99ER plate for special TI functions, such as Fest West. I can use this plate as it has no official Wisconsin stickers on it, and Arizona therefore doesn't consider it an official license plate.

Second, some good words about John McDevitt and Rave 99.

I ordered the new Rave 99's PE/2c expansion box last summer. I have just recently gotten the box up and running. During this entire time, Rave 99, in the person of John McDevitt, kept me abreast of developments. This was done by frequent mailings. And when I had questions and called John, he was always available to answer my questions.

Never during this development period, with all the times I called John, did he ever make me feel like I was intruding into his free time. And I am sure I must have been at least some of the time.

This letter is to let John and the TI community know how much I appreciated his openness and availability. He has shown that consumer awareness still exists in the TI community, something that other TI developers should be aware of.

I would never hesitate to recommend Rave 99 to anyone because of the way John dealt with me and all the other persons involved in ordering his new Professional Expansion Box series. At one point, he even sent us color pictures to show us that the box was not vaporware. They were pictures of the box from various angles, and one of the Rave 99's work area.

My hat is off to John McDevitt and Rave 99. There just aren't enough good things I can say about John, so I will end this letter here, except to say one thing, "Thanks for all you have done for me and everyone in the TI community. Your faith in TIers everywhere is appreciated!"

The Rave PE/2c that I have is operating "as advertised"!

Tom Wills
Tuscon, Arizona

Gear program docs to inexperienced user

Perhaps you could find room in an upcoming issue of MICROpendium for the enclosed paragraph from a letter I wrote to the author of a fairware program highly rated by your magazine. I wrote:

"Please remember that most software buyers are *not* programmers: if we were, we'd write our own. And remember that many programmers do not realize that, to us, the documentation is just as important as the assembly code. There is no difference to the user between a program that will not run and a program that the user cannot figure out how to make run: both get scrapped. Good English language usage requires just as much precision, convention and formality as does a computer; the difference is that people can sometimes think their way through the confusion: a computer will just crash. Please, please, take these docs to the most *inexperienced* TI operator you can find: one who thinks super programming is a one-note 'Mary Had a Little Lamb' written in BASIC. Let him/her write your docs. Then take them to an English teacher, professional writer, newspaper editor or someone else who writes well and have them "cooked" for spelling and grammar. My solution was to marry a woman with a degree in journalism and hang onto her for 30 years. I showed these to a friend of mine, an English professor at a nearby college. His comment was, 'If I were a personnel director and had seen just the program demonstrated, I would hire the writer sight unseen; if I had seen just the docs, I would have pitched them and would not have given him an interview.'

"The best docs I have seen are Jim Swedlow's SIDE*PRINT and Asgard's Spell-It. All documentation should be this clear and understandable."

Thank you. We "Bozos" need all the help we can get.

Harry Ledyard
Golden, Colorado

Alberta 'orphans' impress easterner

My April MICROpendium arrived May 8 with the announcement of the Orphan Reunion to be held on May 11. I was flying out to Calgary on May 10 and got in touch with Fred Kessler that night. Needless to say, I made the meeting and was very impressed.

There were three user groups who get together for this, I believe, annual meeting, Edmonton, Calgary and Red Deer. There were 16 systems set up, two TI Professionals and the balance TI99/4As and Geneves, as I recall.

They had demo programs running that I had never seen before that certainly showed the great potential of our orphan. Fred Kessler had a picture he had done with MY-Art of an offshore oil rig proposed by Mobil for the Hibernia oil field. He estimates that 100 hours of work went into the finished endeavour. A beautiful picture was the result.

A TIer from Edmonton gave a demonstration of TIM, the TI Image Maker by Gary Bowser of Toronto. I had seen Gary's demonstration in Ottawa at the TI-Fest in April but I was more impressed by this gentleman's pictures, which were outstanding. As I had to leave to get my grandson back to Calgary to go to work, I left before the demo was completed so I didn't get his name, but I'm certainly going to get in touch with him through Fred Kessler. He was doing such a good job that several of those present were going to order the TIM.

The caliber of the TIers I met there and their friendly enthusiasm bodes well for the TI's future in that area.

If you care to print any part of this letter to give these deserving TIers some recognition for their efforts I'm sure they will appreciate it.

After reading Franklyn Hale's letter in May Feedback, it points up the fact that we who are happy with our Geneves and other

(See Page 7)

Feedback

(Continued from Page 6)

Myarc products are letting Lou Phillips down by not telling how pleased we are with his products. Certainly the Orphan group were happy with their Geneves, and several had hard drives that they praised when I asked them.

John Taylor
Fort Erie, Ontario, Canada

Program price lower; Asgard has plans

Regarding the review of High Gravity (May 1991) — I must admit I was a bit shocked to see it. The program was published about five years ago and hasn't been updated in four — usually you don't see the star treatment for something of this age, but I certainly appreciate it! There is one small error in the review, however — the price is $4.95, plus $2.50 for shipping and handling, and *not* $14.95. That was the price four years ago, but as with everything, its price has been marked down gradually over the years. I suppose that would make the program a considerably better value.

Oh, and as for the graphics of the program, they were considered pretty good when it was released five years ago!

Regarding MIDI Master, Michael Maksimik and I have managed to bridge our differences of opinion and have come to a compromise. Asgard Peripherals is an official dealer for Crystal Software and will be both reselling and supporting the device. I have always believed, and still do, that Mike's work with MIDI is a valuable addition to the 99/4A's already impressive list of capabilities, and I intend to do my part to encourage and support its continued development.

Finally, a note to all my customers and those who follow my work. Asgard Software, Peripherals and Publishing have been undergoing a major restructuring (I first called it a "reorganization" and everyone thought we went Chapter 11), that will profoundly change the way we do business. As a result, things have been chaotic lately. I'd like to apologize for the inconveniences this has caused our customers as of late. Ultimately, I expect the results will include dramatically improved service, an even broader product line and better support to both our authors and customers. I also hope to get our little publication, Reflections, back on a regular schedule again. For the moment, though, it has caused nothing but frustration for everyone.

When the restructuring is completed, I expect to make a complete announcement detailing the changes and their consequences, but for the moment I have to ask everyone to bear with us a little longer.

Chris Bobbitt
Asgard Software
Rockville, Maryland

Since this letter was received, Asgard has announced that Harry Brashear has assumed a number of responsibilities at Asgard. — Ed.

Problems reading D/V80 text files

How do I read/see/use "*README," among other files on the MICROpendium disks? I have tried TI-Writer — with the writing format on text editor and formatter will not open a file for me.

I am not a programmer and cannot run some "notable" programs such as Funnelweb, etc. that I can obtain through my local club. I now have a "tan" 99/4A (which works just about fault free), a CorComp 9900 micro-expansion system (32K, RS232, disk system controller — all of which work well), two free-standing disk drives, and a faithful Panasonic KX-P1091 printer. I gave up on the TI-Writer program when I first started out, and use Companion for all my word processing and other "typing" work.

So, dear editor, how do I read/see/use *README, among others?

Carl R. Heineman
Alexandria, VA

The *README files on the MICROpendium disks are in D/V80 format. Most text files on the TI and Geneve are in D/V80 format. Unfortunately, Companion does not use D/V80 files and thus cannot "read" these files. There are numerous programs which let you read a D/V80 file, including TI-Writer, DM1000, Funnelweb, etc. We've published several file-reading programs in past issues, including READ-ALL by Michel Montmigny which appeared in the August 1990 edition. Load this XBASIC program into your TI and it will list all the text files on a disk and display them on the screen or output them to a printer. It's easy to use, and should solve your problem. — Ed.

TI mini-computer operating systems and the Geneve

I have one question. Several years ago I read in some publication (I think it was a user group newsletter) of a group or organization which dealt a lot with Texas Instruments mini-computer systems. This article made some mention of operating systems that may work on the CPU used in the Geneve, as well as other programs. I wonder if you have heard of such a group, especially as I recall that the group was located in Austin, Texas. Any knowledge about this?

Rudy Johnson
Las Vegas, Nevada

Not specifically, but you may want to call Texas Instruments at 1-800-TI-CARES. Lately, also, CompuServe's TI Forum has been dealing extensively with numerous TI consumer products, not just the 99/4A and Pro. Others readers may want to share what they know with us. — Ed.

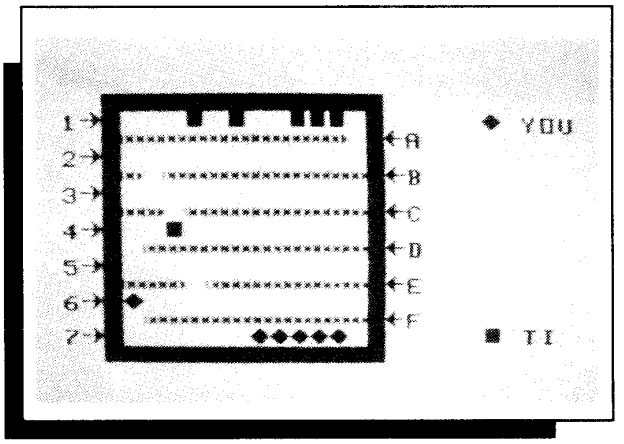
The Feedback column is a forum for TI99/4A and Geneve users. The editor will condense submissions when necessary to conserve space. We ask readers to restrict themselves to one subject for the sake of simplicity. Mail Feedback items to MICROpendium Feedback, P.O. Box 1343, Round Rock, TX 78680.

We're Fighting For Your Life.
American Heart Association

BASIC

Rise and Fall Game

By REGENA



First, a note concerning a possible "problem" that happens when you type in the "Kuwait" program (March 1991) using Extended BASIC. If you RUN the program in Extended BASIC, it will stop when it reaches the statement defining colors in Set 15. You need to SAVE the program and RUN it in regular console BASIC. More than one person has written me saying he cannot load the program in BASIC.

If you look at a catalog of the disk, you will notice that the Kuwait program you saved in Extended BASIC may have a size of 49 and a type of INT/VAR254. This means that the program has used the 32K memory expansion. BASIC will not recognize INT/VAR as a program that can be loaded. The solution is simple:

1. With the Extended BASIC module in, press 2 for Extended BASIC.
2. CALL FILES(1) <ENTER>
3. NEW <ENTER>
4. OLD DSK1.KUWAIT (to load your typed program in XB)
5. SAVE DSK1.KUWAIT (saved correctly now)
6. <FCTN> <QUIT>
7. Press 1 for TI BASIC
8. CALL FILES(1) <ENTER>
9. NEW <ENTER>
10. OLD DSK1.KUWAIT
11. RUN

As usual, use the CALL FILES(1) procedure to free up more space. In Extended BASIC now the program will be saved as type PROGRAM and can be loaded in regular console BASIC and run.

Remember, unless you are using two or more disk drives and a printer all at once, you do not need the default value of CALL FILES(3). As *standard practice*, I use the CALL FILES(1) procedure before I start programming.

My younger children got out of school for the summer vacation and wanted an easy two-player game on the computer. This month's program is called "Rise and Fall" because the red balloons rise and the blue blocks fall. The game screen shows the blocks starting at the top level and the balloons starting at the bottom level. Dividing each level is a barrier that has one opening that can be moved to the left one space with each move. Each level is like a conveyer belt that can move objects one space to the right with each move.

One player will guide balloons, and one will guide blocks. Choose a number 1 through 7 to move objects on a row, or choose a letter A through F to move the opening on the barrier. If the opening appears above a balloon, the balloon rises; if the opening appears below a block, the block falls. It is possible to rise or fall more than one level if the openings are lined up. The balloon wins if it is first to the top, and the block wins if it is first to the bottom. Try to get your own object to the opposite goal while blocking the opponent's progress.

Notice that the numbers moving the objects move all objects on that level as if on a conveyer belt, and they always move to the right. If a block falls on a balloon or another block, it breaks them and one block remains. If a balloon rises to the same position as another balloon, one pops and only one balloon remains.

I had the program written for two players, then decided I had better add the feature of one player versus the computer. The player still gets to choose balloons or blocks and always gets to play first. Since I'm not that great at playing games, the computer's strategy is not very complex and is not that hard to beat. I use an offensive strategy only (don't even examine where the opponent is) and simply move the highest balloon up or the lowest block down by moving the barrier or the row. You might want to add some strategy to make the computer better. Keep in mind, though, that the more things you check, the slower the computer will seem. Children don't want to wait too long for the computer's move.

P(1) and P(3) are position numbers to place the arrows as turns change. E() are the positions in each barrier where the spaces are (1 through 12). Characters 60 and 62 have been redefined as arrows. NP is the number of players, 1 or 2. PL is Player 1's choice, 1 for balloons and 2 for blocks. C is the coordinate at the left edge of the screen.

Lines 100-310 print the instruction screen while defining graphics characters. Lines 320-430 allow you to choose one or two players and balloons or blocks. Lines 440-460 clear the screen and make it white. Lines 470-500 draw the game outline. Lines 510-570 draw the rows and arrows, and Lines 580-620 label the arrows.

Lines 630-690 randomly place the spaces on each of the barriers, where E(J) is the position of each space. Lines 700-830 place six blocks (Character 104) randomly on the top row, checking to see if any fall. Lines 840-970 place six balloons (Character 96) randomly on the bottom row, checking to see if any rise. Lines 980-1130 show the markers on the screen and label them to indicate turns.

Lines 1140-1180 switch markers to indicate whose turn it is. Lines

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REGENA ON BASIC—

(Continued from Page 8)

1190-1240 receive the letter or number for the player's move. Lines 1250-1280 indicate the computer's move for a one-player game. Lines 1290-1430 are the procedure if the computer is playing blocks, and Lines 1440-1560 are the procedure if the computer is playing balloons.

Lines 1570-1740 are the procedure to move an opening on the barrier. Lines 1750-1940 are a subroutine to check to see if a balloon should rise or a block should fall. Lines 1950-2140 are used to move a row of objects. Line 2100 calls the subroutine to see whether objects rise or fall. Lines 2150-2240 end the game.

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

RISE AND FALL

```
100 REM RISE AND FALL !063
110 REM BY REGENA !071
120 DIM P(3),E(6)!167
130 CALL CLEAR !209
140 CALL SCREEN(8)!153
150 CALL CHAR(60,"102060FF60
201")!089
160 PRINT "    ** RISE AND FA
LL **" !038
170 CALL CHAR(62,"080406FF06
0408")!158
180 PRINT : :"THE RED BALLOO
NS WILL RISE." !023
190 CALL CHAR(96,"183C7EFF7E
3C18")!247
200 CALL COLOR(9,7,1)!184
210 PRINT :"THE BLUE BLOCKS
WILL FALL." !254
220 CALL CHAR(104,"7E7E7E7E7
E7E7E")!064
230 CALL COLOR(10,5,1)!223
240 PRINT :"SELECT AN ARROW
TO EITHER" !239
250 CALL CHAR(112,"FFFFFFFFF
FFFFFFF")!061
260 PRINT :"MOVE OBJECTS OR
MOVE AN" !087
270 CALL CHAR(113,"0000AABBB
BAA")!166
280 PRINT :"OPENING." !094
290 CALL COLOR(11,14,1)!017
300 PRINT : :"BLOCK YOUR OPP
ONENT WHILE" !236
310 PRINT :"TRYING TO REACH
YOUR GOAL." !053
320 PRINT : :"CHOOSE  1  ONE
 PLAYER" !035
330 PRINT TAB(9);"2  TWO PLA
YERS" !060
340 CALL KEY(3,K,S)!190
350 IF (K<49)+(K>50)THEN 340
 !104
360 NP=K-48 !159
370 IF NP<2 THEN 390 !220
380 PRINT : :"PLAYER 1 --" !
112
390 PRINT :"CHOOSE  1  ` BAL
LOON" !037
400 PRINT "         2  h BLOC
K" !218
410 CALL KEY(3,K,S)!190
420 IF (K<49)+(K>50)THEN 410
 !174
430 PL=K-48 !157
440 REM DRAW SCREEN !232
450 CALL CLEAR !209
460 CALL SCREEN(16)!201
470 CALL HCHAR(4,5,112,14)!2
23
480 CALL VCHAR(5,5,112,14)!2
38
490 CALL VCHAR(5,18,112,14)!
035
500 CALL HCHAR(18,5,112,14)!
021
510 C=5 !255
520 FOR J=6 TO 16 STEP 2 !03
4
530 CALL HCHAR(J,C+1,113,12)
!043
540 CALL HCHAR(J-1,C-1,62)!2
18
550 CALL HCHAR(J,C+14,60)!08
0
560 NEXT J !224
570 CALL HCHAR(17,C-1,62)!00
6
580 FOR J=1 TO 6 !062
590 CALL HCHAR(J*2+3,C-2,48+
J)!169
600 CALL HCHAR(J*2+4,C+15,64
+J)!220
610 NEXT J !224
620 CALL HCHAR(17,C-2,55)!00
9
630 REM START POSITIONS !080
640 FOR J=1 TO 6 !062
650 RANDOMIZE !149
660 R=INT(RND*12+1)!206
670 CALL HCHAR(4+2*J,C+R,32)
!238
680 E(J)=R !012
690 NEXT J !224
700 FOR J=1 TO 6 !062
710 RANDOMIZE !149
720 R=INT(RND*12+1)!206
730 CALL GCHAR(5,R+C,GC)!128
740 IF GC<>32 THEN 710 !253
750 CALL HCHAR(5,R+C,104)!08
7
760 Y=1 !017
770 CALL GCHAR(4+2*Y,R+C,GC)
!087
780 IF GC=113 THEN 830 !230
790 CALL HCHAR(3+2*Y,R+C,32)
!252
800 CALL HCHAR(5+2*Y,R+C,104
)!047
810 Y=Y+1 !043
820 IF Y=7 THEN 2160 ELSE 77
0 !219
830 NEXT J !224
840 FOR J=1 TO 6 !062
850 RANDOMIZE !149
860 R=INT(RND*12+1)!206
870 CALL GCHAR(17,R+C,GC)!18
0
880 IF GC<>32 THEN 850 !138
890 CALL HCHAR(17,R+C,96)!10
0
900 Y=7 !023
910 CALL GCHAR(2+2*Y,R+C,GC)
!085
920 IF GC=113 THEN 970 !114
930 CALL HCHAR(3+2*Y,C+R,32)
!252
940 CALL HCHAR(1+2*Y,C+R,96)
!004
950 Y=Y-1 !044
960 IF Y=1 THEN 2180 ELSE 91
```

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REGENA—

(Continued from Page 9)

```
0 !117
970 NEXT J !224
980 CALL HCHAR(5,24,96)!010
990 CALL HCHAR(17,24,104)!10
1
1000 A=1 !249
1010 IF PL=2 THEN 1050 !112
1020 P(1)=5 !115
1030 P(3)=17 !169
1040 GOTO 1070 !129
1050 P(1)=17 !167
1060 P(3)=5 !117
1070 IF NP>1 THEN 1130 !195
1080 CALL HCHAR(P(1),26,89)!
199
1090 CALL HCHAR(P(1),27,79)!
199
1100 CALL HCHAR(P(1),28,85)!
197
1110 CALL HCHAR(P(3),26,84)!
196
1120 CALL HCHAR(P(3),27,73)!
195
1130 TURN=-1 !195
1140 REM MAKE MOVE !079
1150 TURN=-SGN(TURN)!080
1160 CALL HCHAR(P(A),23,32)!
255
1170 A=2-TURN !005
1180 ON A GOTO 1190,1190,126
0 !103
1190 CALL KEY(3,K,S)!190
1200 CALL HCHAR(P(A),23,62)!
002
1210 CALL HCHAR(P(A),23,32)!
255
1220 IF (K>64)+(K<71)=-2 THE
N 1580 !192
1230 IF (K>96)+(K<103)=-2 TH
EN 1580 !242
1240 IF (K<48)+(K>55)THEN 11
90 ELSE 1960 !186
1250 REM COMPUTER !073
1260 IF NP=2 THEN 1190 !254
1270 CALL HCHAR(P(A),23,62)!
002
1280 IF PL=2 THEN 1450 !001
1290 REM BLOCKS !152
1300 FOR J=6 TO 1 STEP -1 !1
72
1310 FOR BP=1 TO 12 !180
1320 CALL GCHAR(3+J*2,C+BP,G
B)!134
1330 IF GB=104 THEN 1370 !00
3
1340 NEXT BP !040
1350 NEXT J !224
1360 J=1 !002
1370 CALL GCHAR(5+J*2,C+BP,G
B)!136
1380 IF GB=32 THEN 1420 !004
1390 IF GB=96 THEN 1420 !014
1400 ROW2=J !050
1410 GOTO 1980 !018
1420 K=64+J !072
1430 GOTO 1580 !129
1440 REM BALLOONS !052
1450 FOR J=2 TO 7 !064
1460 FOR BP=1 TO 12 !180
1470 CALL GCHAR(3+J*2,C+BP,G
B)!134
1480 IF GB=96 THEN 1520 !114
1490 NEXT BP !040
1500 NEXT J !224
1510 J=7 !008
1520 CALL GCHAR(1+J*2,C+BP,G
B)!132
1530 IF GB=32 THEN 1560 !145
1540 ROW2=J !050
1550 GOTO 1980 !018
1560 K=63+J !071
1570 REM MOVE OPENING !065
1580 CALL SOUND(100,990,2)!1
38
1590 ROW=K-64 !247
1600 IF ROW<8 THEN 1620 !015
1610 ROW=ROW-32 !159
1620 RW=4+2*ROW !219
1630 IF E(ROW)<>1 THEN 1690
!192
1640 CALL HCHAR(RW,C+1,113)!
170
1650 CALL HCHAR(RW,C+12,32)!
172
1660 E(ROW)=12 !149
1670 GOSUB 1760 !054
1680 GOTO 1150 !209
1690 CE=C+E(ROW)!244
1700 CALL HCHAR(RW,CE,113)!0
52
1710 CALL HCHAR(RW,CE-1,32)!
191
1720 E(ROW)=E(ROW)-1 !206
1730 GOSUB 1760 !054
1740 GOTO 1150 !209
1750 REM CHECK RISE OR FALL
!139
1760 RW=4+2*ROW !219
1770 CE=C+E(ROW)!244
1780 CALL GCHAR(RW-1,CE,GC)!
025
1790 IF GC<>104 THEN 1850 !1
67
1800 CALL HCHAR(RW-1,CE,32)!
191
1810 CALL HCHAR(RW+1,CE,104)
!239
1820 IF RW+1=17 THEN 2160 !2
01
1830 ROW=ROW+1 !105
1840 GOTO 1760 !053
1850 RW=4+2*ROW !219
1860 CE=C+E(ROW)!244
1870 CALL GCHAR(RW+1,CE,GC)!
024
1880 IF GC<>96 THEN 1940 !21
8
1890 CALL HCHAR(RW+1,CE,32)!
190
1900 CALL HCHAR(RW-1,CE,96)!
201
1910 IF RW-1=5 THEN 2180 !17
0
1920 ROW=ROW-1 !106
1930 GOTO 1850 !144
1940 RETURN !136
1950 REM MOVE OBJECTS !059
1960 CALL SOUND(100,990,2)!1
38
1970 ROW2=K-48 !043
1980 R2=3+2*ROW2 !231
1990 CALL GCHAR(R2,C+12,TGC)
!053
2000 CALL HCHAR(R2,C+12,32)!
135
2010 FOR J=11 TO 1 STEP -1 !
217
2020 CALL GCHAR(R2,C+J,GC)!2
54
2030 IF GC=32 THEN 2060 !136
2040 CALL HCHAR(R2,C+J,32)!1
64
2050 CALL HCHAR(R2,C+J+1,GC)
!186
2060 NEXT J !224
2070 CALL HCHAR(R2,C+1,TGC)!
003
2080 IF ROW2=7 THEN 2110 !04
3
2090 ROW=ROW2 !224
2100 GOSUB 1760 !054
2110 ROW=ROW2-1 !156
2120 IF ROW=0 THEN 1150 !046
```

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EXTENDED BASIC

Robot teacher

By JERRY STERN
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Two hundred years ago, education consisted of memorization of facts and figures, prose and poetry. Rote memorization was done by writing down the day's lesson, over and over and over again, until the facts had settled permanently into the student's brain. Modern schools don't require as much memorization as did those of that time, but there are still a few subjects and instructors that require that kind of exercise in learning. This month's program, TUTOR, may help students survive such subjects.

A memory program, or a robotic tutor, should work like a human being with a stack of flash cards. Each card will have a fact written on one side, and the matching fact on the other side. As the student is shown one side of each card, he or she must guess or recite the opposite side. Either side may be shown at random. The stack of flash cards should shrink—after the student has answered a question correctly several times, the card for that question should be removed from the stack. With practice, the stack will shrink down to only the cards with the facts most difficult to remember, and those remaining facts will receive extra attention.

If a robotic tutor could be built, it would need interchangeable fact cards, so that any subject could be taught if its information could be expressed as paired facts. TUTOR is the computer version of that drilling robot. Given a set of facts, TUTOR will pick a card at random, present one side at random, and wait for a key to be pressed. The student does not type in the answer, but simply presses a key when she or he is ready with a matching answer. TUTOR then displays the matching fact, and the student can tell TUTOR "Yes, I got it right!" or "No, but keep going!" Yes, this is the honor system for teaching. If every answer must be typed in, the entire system slows down to a crawl while the student types the answer, the computer analyzes the spelling, and the scoring is calculated. Obviously the student using this system must be self-motivated to learn. I used this technique in school from about the fifth grade on, right up through college, sometimes using the cards, sorted into piles of correct answers and cards to retest, and later on using computers to present the questions and keep score. The computer version is much faster.

Here's how to run TUTOR. When you run the program, the first choice will be a menu, where you can choose to use a disk file to supply the test pairs, or write a new disk file of test pairs, or use the built-in test of TI BASIC color code numbers, or quit the program. There are three ways to enter the facts. One, the facts can be typed directly into TUTOR. Second, a list of paired facts can be typed into TI-WRITER, or equivalent. Leave no blank lines anywhere in the file, and save the file normally with the SF command. Facts must fit on one line, and each pair of facts uses two consecutive lines. Third, the file can be typed directly into the DATA statements in TUTOR, replacing the color codes fact pairs. Again, use only one fact to a line; each fact pair must be on two consecutive lines; and the last line at the end of the DATA statements must be DATA ***. This last method is best for cassette users.

Once a set of fact pairs has been placed in memory, TUTOR begins testing. After each fact is chosen and displayed at random, the student can press a key when ready, and then answer, "Yes, right." or "No, wrong." or "Exit, I'm outta here, dude." TUTOR keeps track of how many times each question is answered right or wrong, and as each question is answered five more times correctly then incorrectly, that pair of facts is removed from the stack. The five correct answer setting can be changed — use a lower number with long sets of fact pairs — by changing the default value for the variable CNT in line 80. As the drilling continues, TUTOR displays how many more cards must be answered correctly to end the drill, and the percentage of correct answers. If students want to see how well they are learning their subject, they can write down the final percentage of correct answers for each practice run. Usually, that percentage will go up after every practice drill. (If it doesn't, use a larger number for the repetitions setting in line 80 or split the set of practice facts into several smaller drill exercises.)

After the first drill has been completed, or if the student chooses to exit from the exercise, the original menu will return, but with one new option. The new choice allows drilling from the fact set already loaded into memory, without reloading from the keyboard, disk, or DATA statements.

Here's how TUTOR works. The fact pairs are stored in a string array, K$(1 to 2, 1 to 100). The right/wrong scores for each fact pair are in the numeric array A(1 to 100), and these scores are all set at zero to start the drill. The size of the drill set is stored in the variable L, and LL is used for the part of the stack still in use. For each test question, TUTOR chooses a pair of facts at random, randomly chooses which fact to present first, and after the reply of yes or no is entered, adds one to the score in A() for a wrong answer, or subtracts one for a correct answer. Whenever a score reaches negative five, the pair of facts and their score are swapped into the last position in the array of facts, and then the count of facts in use (LL) is reduced by one. That leaves a smaller stack of facts to choose

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REGENA—

(Continued from Page 12)

```
2130 GOSUB 1760 !054
2140 GOTO 1150 !209
2150 REM END OF GAME !160
2160 PRINT "h BLOCK WINS!" !
229
2170 GOTO 2190 !229
2180 PRINT "` BALLOON WINS!"
 !123
2190 PRINT :"PLAY AGAIN?  Y/
N";!231
2200 CALL KEY(3,K,S)!190
2210 IF (K=89)+(K=121)THEN 1
30 !198
2220 IF (K<>78)+(K<>110)=-2
THEN 2200 !221
2230 CALL CLEAR !209
2240 END !139
```

EXTENDED BASIC—

(Continued from Page 11)

test questions from. When LL reaches zero, each question has been answered correctly five more times than it was answered wrong, and the program returns to the menu for a new drill or another practice session on the same drill.

Some last hints, dredged out of an educational psychology expert: The best drilling and memorization sessions last at least twenty minutes for each set of material, and no more than one hour. One drill each day for a week is far more effective than five drills in one afternoon. And last, the conditions present when you learn a set of facts become the conditions where you will recall them most easily. So, if you memorize lists of facts with the television or stereo playing in the background, and caffeinated to the five-coffee cup level, that's perfectly o.k. if your final exams will also have televisions and coffeepots available. In other words, the best memorization environment matches the testing environment.

It's nearly the time of year to start using TUTOR. The store windows all read "Back-to-School Sale!" You've only got a few weeks to type in TUTOR, and get ready to memorize the presidents, or the countries and capitals of South America, or maybe something really useful, such as the formulas for calculating how much water will fill swimming pools of different shapes. And then go explore that volume of water before the pools dry up for the season on Labor day.

TUTOR

```
80 CNT=5 ! DEFAULT NUMBER OF
 CORRECT REPETITIONS FOR EAC
H REPLY !115
90 DRV$="DSK2." !DEFAULT DRI
VE !254
100 ! TUTOR !065
110 ! J.L. Stern 7/91 TIXB !
008
120 ! Tutors by repetitive m
emory test from data file !1
19
130 OPTION BASE 1 !137
140 DIM K$(2,100),A(100)!045
150 LINE$=RPT$(CHR$(95),28)!
186
160 CALL CLEAR :: CALL BLUE
:: CALL TITLE3 !134
170 RANDOMIZE !149
180 DISPLAY AT(10,1):"Choose
:": :"Drill from a disk text
 file":"Create a disk drill
file":"Learn TI XB Color Cod
es":"Quit": :"  DCLQ" !015
190 IF AD THEN DISPLAY AT(15
,1):"Reuse file in memory":"
Quit":"  DCLRQ" !245
200 IF AD THEN V$="L1DdCcQqR
r" ELSE V$="L1DdCcQq" !158
210 CALL KEYAT(17,1,X,V$)!10
8
220 ON POS(V$,CHR$(X),1)GOTO
 260,260,510,510,670,670,104
0,1040,230,230 !061
230 ! Reuse data set !205
240 AR,AW=0 !149
250 FOR LL=1 TO L :: A(LL)=0
 :: NEXT LL :: GOTO 320 !026
260 ! Learn TI XB Color Code
s !057
270 RESTORE 1060 :: L=0 !010
280 L=L+1 !017
290 READ K$(1,L):: A(L)=0 !1
59
300 IF K$(1,L)="***" THEN L=
L-1 :: GOTO 320 !051
310 READ K$(2,L):: GOTO 280
!087
320 ! Drill routine !192
330 LL=L !162
340 CHOICE=INT(RND*LL)+1 !14
6
350 EITHER=INT(RND*2)+1 !011
360 IF EITHER=1 THEN OTHER=2
 ELSE OTHER=1 !163
370 PRINT LINE$ !232
380 PRINT "Match: ";K$(EITHE
R,CHOICE);" " !252
390 CALL PAUSE !232
400 PRINT "The matching term
 is:":K$(OTHER,CHOICE);" " !
031
410 PRINT "  Press Yes, No,
or Exit." !056
420 V$="YyNnEe" :: CALL KEYA
T(23,27,REP,V$)!240
430 IF REP=69 OR REP=101 THE
N AD=-1 :: GOTO 160 !062
440 IF REP=89 OR REP=121 THE
N A(CHOICE)=A(CHOICE)-1 :: A
R=AR+1 ELSE A(CHOICE)=A(CHOI
CE)+1 :: AW=AW+1 !246
450 PRINT AR;"correct of";AR
+AW;"=";AR/(AR+AW)*100;"%":"
(";L*CNT+AW-AR;"more)" !111
460 IF A(CHOICE)>-CNT THEN 3
40 ELSE KT$=K$(1,LL):: K$(1,
LL)=K$(1,CHOICE):: K$(1,CHOI
CE)=KT$ !001
470 AA=A(LL):: A(LL)=A(CHOIC
E):: A(CHOICE)=AA !128
480 KT$=K$(2,LL):: K$(2,LL)=
K$(2,CHOICE):: K$(2,CHOICE)=
KT$ :: LL=LL-1 !158
490 IF LL=0 THEN AD=-1 :: PR
INT "Wow!":"You've learned t
his well!" :: CALL PAUSE ::
GOTO 160 !064
500 GOTO 340 !164
510 ! Drill disk file !037
520 DISPLAY AT(17,1):"Enter
the file name of the  tutori
al file:":DRV$ !045
530 CALL KEY(3,K,S)!190
540 ACCEPT AT(19,1)SIZE(-28)
VALIDATE(UALPHA,DIGIT,"._"):
FN$ !151
550 IF LEN(FN$)<6 THEN CALL
SOUND(400,-3,1):: GOTO 540 !
184
560 OPEN #1:FN$,DISPLAY ,VAR
IABLE 80 !048
570 L=1 :: AR,AW=0 !027
580 LINPUT #1:K$(1,L)!043
590 A(L)=0 !177
600 IF EOF(1)THEN L=L-1 :: G
OTO 650 !212
610 LINPUT #1:K$(2,L)!044
620 DISPLAY AT(24,1):"Readin
g: ";SEG$(K$(1,L)&RPT$(" ",1
9),1,19)!172
630 L=L+1 !017
640 GOTO 580 !149
650 CLOSE #1 :: DISPLAY AT(2
4,1):"" !113
660 GOTO 320 !144
670 ! Create disk drill file
 !185
680 TB$=CHR$(128)&CHR$(134)&
CHR$(128)&CHR$(213)&CHR$(134
)&CHR$(139)&CHR$(144)&RPT$(C
HR$(213),13)&CHR$(128)&CHR$(
134)!166
690 DISPLAY AT(1,8)ERASE ALL
:"New Drill File" !243
```

(See Page 13)

EXTENDED BASIC—

(Continued from Page 12)

```
700 CALL HCHAR(2,10,95,14)!2
27
710 DISPLAY AT(4,1):"Name of
 new drill file?":DRV$ !023
720 CALL KEY(3,K,S)!190
730 ACCEPT AT(5,1)VALIDATE(U
ALPHA,DIGIT,"._")SIZE(-28):F
N$ !097
740 IF LEN(FN$)<6 THEN CALL
SOUND(400,-3,1):: GOTO 730 !
118
750 OPEN #1:FN$,DISPLAY ,VAR
IABLE 80 !048
760 DISPLAY AT(7,1):"Enter e
ach fact pair on two lines,
like this:" !067
770 DISPLAY AT(10,1):"Fact 1
:" :: DISPLAY AT(15,1):"Fact
 2:" !078
780 DISPLAY AT(11,1):"Invent
or of the analytical":"engin
e-ancestor of the":"TI99/4A"
 :: DISPLAY AT(16,1):"Charle
s Babbage" !219
790 CALL PAUSE :: AR,AW=0 !2
55
800 L=1 :: PRINT " Press Ent
er When Finished" !074
810 CALL KEY(5,K,S)!192
820 PRINT "Fact 1:" !115
830 LINPUT K$(1,L)!127
840 IF K$(1,L)="" THEN 910 !
232
850 A(L)=0 !177
860 PRINT "Fact 2:" !116
870 LINPUT K$(2,L):: PRINT L
INE$ !234
880 IF K$(2,L)="" THEN 910 !
233
890 L=L+1 :: IF L=101 THEN P
RINT "The file is full!" ::
GOTO 910 !213
900 GOTO 820 !134
910 ! done input, save file
!084
920 FOR L2=1 TO L-1 !123
930 PRINT #1:K$(1,L2)!079
940 PRINT #1:K$(2,L2)!080
950 DISPLAY AT(24,1):"Saving
 pair ";L2 !234
960 NEXT L2 !020
970 PRINT #1:TB$ :: CLOSE #1
 :: L=L-1 !175
980 PRINT "File saved as ";F
N$:L;"Fact pairs":" " !132
990 PRINT "If needed, the fi
le may be  edited with TI-WR
ITER or    another text edit
or.          " !037
1000 PRINT "Drill with new f
ile now or  return to menu?
            DM" !055
1010 CALL KEYAT(23,4,T,"DdMm
")!027
1020 ON POS("DdMm",CHR$(T),1
)GOTO 320,320,160,160 !138
1030 GOTO 160 !239
1040 ! Quit !070
1050 CALL CLEAR :: STOP !235
1060 ! Data for TI XB Color
Codes Drill !063
1070 DATA 1 !141
1080 DATA transparent !024
1090 DATA 2 !142
1100 DATA black !093
1110 DATA 3 !143
1120 DATA medium green !025
1130 DATA 4 !144
1140 DATA light green !175
1150 DATA 5 !145
1160 DATA dark blue !206
1170 DATA 6 !146
1180 DATA light blue !069
1190 DATA 7 !147
1200 DATA dark red !096
1210 DATA 8 !148
1220 DATA cyan !010
1230 DATA 9 !149
1240 DATA medium red !065
1250 DATA 10 !190
1260 DATA light red !215
1270 DATA 11 !191
1280 DATA dark yellow !196
1290 DATA 12 !192
1300 DATA light yellow !059
1310 DATA 13 !193
1320 DATA dark green !056
1330 DATA 14 !194
1340 DATA magenta !063
1350 DATA 15 !195
1360 DATA gray !018
1370 DATA 16 !196
1380 DATA white !129
1390 DATA *** !220
28040 SUB KEYAT(R,C,X,V$)!21
7
28045 ! KEYAT(Row, Column, A
SCII Return variable, Valida
tion string) JLS 2/91 !033
28050 ! Combines cursor flas
h with single key entry, val
idation !111
28055 C=C+2 :: CALL GCHAR(R,
C,N(1)):: N(2)=N(1):: N(3),N
(4)=30 !168
28060 CALL HCHAR(R,C,N(1+Y-I
NT(Y/4)*4)):: Y=Y+1 !140
28065 CALL KEY(0,X,S):: IF S
<1 THEN 28060 !092
28070 IF POS(V$,CHR$(X),1)=0
 THEN 28060 !120
28075 CALL HCHAR(R,C,X)!144
28080 SUBEND !168
29245 SUB TITLE3 !036
29250 DISPLAY AT(1,12)ERASE
ALL:"TUTOR" :: CALL CHAR(95,
"00FF00FFFF"):: CALL HCHAR(2
,14,95,5)!161
29255 DISPLAY AT(4,8):"Memor
y Tester":"     and Drill Pr
ogram" !189
29260 DISPLAY AT(7,3):"J. L.
 Stern   July, 1991" !164
29265 SUBEND !168
29505 SUB BLUE !149
29510 ! SWITCHES DISPLAY TO
WHITE ON BLUE; JLS 7/88 !230
29515 CALL SCREEN(5):: FOR L
=0 TO 14 :: CALL COLOR(L,16,
1):: NEXT L :: SUBEND !202
30820 SUB PAUSE !236
30825 FOR D=1 TO 10 :: NEXT
D !192
30830 DISPLAY AT(24,2):"PRES
S ANY KEY TO CONTINUE" !088
30835 CALL KEY(0,K,S):: IF S
<1 THEN 30835 !049
30840 SUBEND !168
```

Gaskill ends TI-Base newsletter

A newsletter aimed at TI-Base users has folded. TI-Base User is no longer being published, according to its publisher, Bill Gaskill. The newsletter ended its run with Volume 2 Number 4. Gaskill says that all subscribers have been refunded and that the newsletter is no longer available.

Gaskill added that all products offered by PRK DataBasics and Junction Softworks are no longer available.

BASIC/Assembly

A TI-Artist CALL LINK, for Instance

By BARRY TRAVER
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This is not the article I originally intended as the next in this BASIC assembly series (I'm still working on an XB program that will write the assembly code for PABS for you if you want to work with files in assembly), but I think you'll find this month's column as interesting and helpful as any in this series so far. The program TIA/LINK (available earlier only as a commercial program published in the Genial TRAVelER) will write for you the assembly source code for a CALL LINK that will put a TI-Artist Instance on the screen at any desired location!

There are some limitations, since we are working in normal graphics mode in Extended BASIC rather than with the bit-mapped mode used in TI-Artist itself. You may be interested to know that TI LOGO has similar limitations: since the graphics are accomplished by redefining characters, sooner or later the turtle can "run out of ink." In normal graphics mode (the usual mode in TI BASIC or TI Extended BASIC), you only have at the most 16 character sets to work with (normally only 14 in XB, because the other space is usually reserved for sprite information), so you do have a limited number of characters that can be redefined.

Why not use bit-mapped graphics? Well, that can be done from Extended BASIC, but it is very complicated and difficult to do. If you want to play with bit-mapped graphics in Extended BASIC, I recommend that you purchase from Texaments Harry Wilhelm's The Missing Link, which is a rather amazing extension of Extended BASIC specifically in that direction. Harry is able to make working with bit-mapped graphics simple, but I assure you that what Harry makes simple is not simple at all. Bit-mapped graphics work by an entirely different set of rules than what we are accustomed to in Extended BASIC. You may be glad to hear that I do not intend here to entirely change the rules on you, but just to extend significantly the possibilities using the normal graphics mode with which you are already familiar.

Graphics in XB is normally achieved by redefinition of characters. That's what we'll still be doing. XB, however, has two important drawbacks:

1. It takes a long time to redefine a whole bunch of characters and put them on the screen, and;

2. Sometimes you run out of characters to redefine. To that, we may add a third drawback;

3. Creating a graphic can be a tedious thing to do, especially for those of us (like me) who have perhaps little art talent.

Let's see if we can overcome those drawbacks, one by one.

- The obvious answer to the slow speed of redefining characters and creating the screen display is to put those operations into assembly. (We've done things like that before with FONTALS, GRAPHICOMP, and VDP/SAVER, but with TIA/LINK we'll be doing it with the emphasis on pictures rather than text.)

- Since we will be staying with normal graphics mode, there's no complete answer to the problem of running out of characters, but TIA/LINK will let you make use of character sets 15 and 16 in XB (that's actually 16 additional character definitions!), so you won't "run out of ink" as fast as you would otherwise.

That leaves one other drawback to overcome:

- There aren't extensive graphics libraries for graphics mode in XB, but we now have in abundance such libraries for other graphics formats. The standard format for graphics is the TI-Artist Instance. There are lots of images, icons, or pictures either already in TI-Artist Instance format or able easily to be converted into TI-Artist Instance format. Think, for example, of the thousands (no exaggeration) of graphics available in Ron Wolcott's TIPS format, all of which can be converted to TI-Artist format! In addition, Ron wrote a program to convert CSGD graphics to TIPS format, from which you can convert the pictures to TI-Artist Instance format.

With all those resources available, why not liven up your XB programs by adding some pictures to your XB programs? The CALL LINK("GRAFIC",ROW,COL) created by TIA/LINK is an easy way to do this. The passed parameters (ROW and COL) permit the placing of the graphic at any desired screen location, i.e., at any ROW and COLumn. That is, you can use the same CALL LINK to put the picture on the screen wherever you want.

As is normally the case with Extended BASIC, it can be more efficient to reuse characters when possible, if the same 8x8 character pattern appears more than once in the picture. In general, you ought always to (re)use the space character — i.e., CHR$(32) — as a space character whenever possible. With version 1.3 of TIA/LINK, you do have the choice of whether or not to reuse characters other than the space character. True, TIA/LINK does run faster if you only reuse the space character, but the number of characters that can be redefined is limited, so I recommend that you ordinarily choose the other option: it may allow you to use TIA/LINK with certain Instances that would otherwise be just slightly too large for you to use.

When TIA/LINK is at work redefining characters, it starts at CHR$(159) (the last character in character set 16) and works backwards. This means that 33 characters (not merely 17 characters) can be redefined before it starts redefining any "regular" characters (i.e., from ASCII 33 to 126) in your character set. If you're willing to give up lower case (i.e., from ASCII 97 to 122), that will give you another 30 characters or so to work with for the picture, which means that you can put a TI-Artist Instance on the screen that may measure, say, eight rows by eight columns (i.e., requiring up to 64 redefined characters, if we assume that none can be reused).

Larger TI-Artist Instances may require some creativity, if you want to have text on the screen at the same time. Again, the problem would have been much more difficult in "ordinary" XB (remember: we have 16 additional character definitions to work with in assembly!), so we've extended the range of the possiblities, but have not removed all of the limitations of graphics mode. If you want a large picture plus text, you may need to redefine separately

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BASIC/ASSEMBLY—

(Continued from Page 14)

some lesser-used characters in your character set that have a lower ASCII number. For example, you may need to use "#", "$", "/", "&", "+", "/", "<", "=", ">", or "@" (that's ten characters right there) to make up for letters of the alphabet that your TI-Artist Instance may have taken away from you.

Let's be even more specific. Suppose you find that your TI-Artist Instance was large enough to require use of characters from ASCII 159 all the way down to ASCII 87. That means you have "lost" your capitals letters from "Z" back to "W" (i.e., from ASCII 90 to ASCII 87). Suppose, however, that you want to place on the screen text that includes, say, the capital letters "W" and "Y". After you display your graphic, you could add the following statements to your XB code before displaying your text to solve the problem:

```
100 CALL CHARPAT(87,A$) ! Get definition for "W"
110 CALL CHAR(35,A$) ! Redefine "#" as "W"
120 CALL CHARPAT(89,A$) ! Get definition for "Y"
130 CALL CHAR(36,A$) ! Redefine "$" as "Y"
```

Thus, if you wanted to display the text "WHY WORRY?" on the screen, you could do it in this way:

```
140 DISPLAY AT(24,10):"#H$ #ORR$?"
```

The graphic itself could be placed on the screen in this way:

```
150 CALL LINK("GRAFIC",9,11)
```

Where 9 and 12 represent the ROW and COLumn where you want the top left corner of the graphic to be placed. (It doesn't matter, of course, whether you put up the text first and then the graphic, or the other way around.)

Note: there is no parameter error checking in the code produced by TIA/LINK, so be careful what values you use for ROW and COLumn — keep that graphic on the screen! Otherwise you'll be writing information to other areas of VDP RAM, and the results may be unpredictable. (You may, however, feel free to use 0 or -1 as a valid value for COL, since there are actually 32 columns, not merely 28, on the screen in graphics mode in XB.)

Incidentally, the format of a TI-Artist Instance file is simpler than it might at first appear. (On the other hand, it might be more complex than you really want to think about right now, so you can skip over these paragraphs if you want — TIA/LINK will work, whether you understand the format for a TI-Artist Instance or not.) If you convert the decimal numbers in a TI-Artist Instance file to hexadecimal numbers (that is, for every line except for the first line), you'll see that the Instance simply defines the graphic in terms of 8 pixel by 8 pixel blocks, just as you are accustomed to doing in normal Extended BASIC. (See the "Pattern-Identifier Conversion Table" appendix in the XB manual.)

How are the 8x8 blocks arranged? Well, I think the TI-Artist Instance does it in a very "natural" way. TI-Artist looks at the 8x8 blocks in the order in which you would normally read the page of a book, so to speak. That is, the sequence is from left to right, top to bottom. The first row is completed before the second row is begun, and so on. For a rectangular picture of four characters by three characters, they would be arranged as follows:

```
CHAR 1  CHAR 2  CHAR 3  CHAR 4
CHAR 5  CHAR 6  CHAR 7  CHAR 8
CHAR 9  CHAR 10 CHAR 11 CHAR 12
```

Similarly, a two-character by two-character picture would be arranged in this order in TI-Artist Instance format:

```
CHAR 1  CHAR 2
CHAR 3  CHAR 4
```

Note well: this is not the way that Extended BASIC looks at a four-character sprite. With XB sprites, the order is top to bottom, and then left to right:

```
CHAR 1  CHAR 3
CHAR 2  CHAR 4
```

In the computer world, there is often no consistency in different programs (or sometimes even in the same program!) as to whether rows or columns are dealt with first. In the TI-Artist Instance format, however, we move first from one column to the next rather than from one row to the next.

The first two numbers in a TI-Artist Instance files tell you the number of columns of 8x8 characters and the number of rows of 8x8 characters in the picture. Each following line gives the pattern of the particular 8x8 character being looked at. (This can be more easily seen, as I suggested, if these numbers are converted from decimal to hexidecimal.) If you wanted to do so, it would not be difficult — now that you know the format — to write a program to convert a normal XB graphic to a TI-Artist Instance, but we'll leave that as a "homework exercise" for talented students who are so inclined.

One more comment: after you are finished with your graphics display in your XB program, you may need to restore character definitions that have been changed. There are a number of ways to do this, but I'll mention two that do it efficiently, using utilities from earlier columns in this series. You can use either FONTALS or VDP/SAVER with normal character definitions to create an assembly routine that will quickly restore your character sets back to the way they were before some of the characters were redefined to put the TI-Artist Instance on the screen. (Here's another possible use of FONTALS: you can also use VDP/SAVER to write an assembly routine to take a "snapshot" of what was done in lines 110-130 in the example given earlier, allowing you to replace those statements with an appropriate CALL LINK to accomplish the same result.)

As you can see, the number of tools in your BASIC Assembly toolbox is gradually increasing, so that you have more and more to work with! Don't forget about using the tools you got in previous issues of MICROpendium. I hope that you will find TIA/LINK — the latest addition to your toolbox — to be a very useful aid to your programming, particularly for fast placement of graphics or Instances on the screen, with full control over where the image is placed. If you've written a boring but useful XB text-only program, why not make it more fun to use by adding a small picture of Snoopy or Woodstock on the screen? You now have what you need to do that, and a lot more!

Traver publishes a diskazine for TI users called Genial TRAVelER.

SAMPLE_I

```
2,2
```

(See Page 20)

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

#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 junto 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 exhasic.

#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 knockout 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. III
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 SUCHRUE
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 must 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 truly adult adventure for use with the TI Adventure Module. Also included is a bonus adventure (not adult) "LOST COLD" which is one of the better ones we have seen recently.

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BASIC/ASSEMBLY—

(Continued from Page 15)

```
15,16,22,224,134,134,224,34
240,8,104,7,97,97,7,68
34,35,40,40,38,17,8,7
68,196,20,20,100,136,16,224
```

TIA/LINK

```
100 ! COPYRIGHT (C) 1991 by
Barry Traver, 835 Green Vall
ey Drive, Philadelphia, PA 1
9128 (phone: 215/483-1379) -
- ALL RIGHTS RESERVED! !187
110 ! TIA/LINK by Barry Trav
er !141
120 DIM DEF$(160)!076
130 DISPLAY AT(1,1)ERASE ALL
:"TIA/LINK, Version 1.3":" M
ICROpendium edition":"  (C)
COPYRIGHT 1991":"   BY BARRY
 A. TRAVER": :!164
140 DISPLAY AT(7,1):"TI-ARTI
ST INSTANCE FILE?":" DSK" ::
 DISPLAY AT(12,1):"A/L SOURC
E CODE FILE?":" DSK" !044
150 DISPLAY AT(17,1):"CALL L
INK NAME?":" GRAFIC" :: DISP
LAY AT(22,1):"REUSE ONLY SPA
CE CHARACTER?":" Y" !234
160 ACCEPT AT(8,2)SIZE(-27)B
EEP:IN$ !091
170 ON ERROR 180 :: OPEN #2:
IN$,INPUT :: ON ERROR STOP :
: GOTO 200 !126
180 ON ERROR 190 :: CLOSE #2
 :: ON ERROR STOP !059
190 RETURN 140 !221
200 ACCEPT AT(13,2)SIZE(-27)
BEEP:OUT$ !233
210 ON ERROR 220 :: OPEN #1:
OUT$,OUTPUT :: ON ERROR STOP
 :: GOTO 240 !147
220 ON ERROR 230 :: CLOSE #1
 :: ON ERROR STOP !098
230 RETURN 180 !005
240 ACCEPT AT(18,2)SIZE(-6)B
EEP:PN$ :: PN$=PN$&RPT$(" ",
6 LEN(PN$))!138
250 ACCEPT AT(23,2)VALIDATE(
"YN")SIZE(-1)BEEP:F$ :: IF F
$="Y" THEN F=1 ELSE F=0 !085
260 W$="" :: INPUT #2:W,H ::
 C=160 :: DISPLAY AT(22,1):"
USING CHARACTER":"" !142
270 IF EOF(2)THEN 360 ELSE L
INPUT #2:I$ !221
280 IF I$="0,0,0,0,0,0,0,0"
THEN W$=W$&CHR$(32):: DISPLA
Y AT(22,16):32 :: GOTO 270 !
030
290 IF F THEN 320 ELSE I=160
 !110
300 IF I$=DEF$(I)THEN W$=W$&
CHR$(I):: DISPLAY AT(22,16):
I :: GOTO 270 !113
310 I=I-1 :: IF I>=C THEN 30
0 !194
320 C=C-1 :: IF C=32 THEN 89
0 ELSE DEF$(C)=I$ !123
330 W$=W$&CHR$(C)!242
340 DISPLAY AT(22,16):C !009
350 GOTO 270 !094
360 CLOSE #2 :: CALL CLEAR !
235
370 FOR I=0 TO 12 :: CALL CO
LOR(I,16,1):: NEXT I :: CALL
 SCREEN(5)!149
380 FOR R=0 TO 1 :: PRINT #R
:"* SOURCE CODE CREATED BY T
IA/LINK, A PROGRAM":"*  COP
YRIGHT (C) 1991 BY BARRY A.
TRAVER," !057
390 PRINT #R:"*    835 GREEN
 VALLEY DRIVE,":"*     PHILA
DELPIA, PA 19128":"*      (P
HONE: 215/483-1379)":" " ::
NEXT R !166
400 FOR R=0 TO 1 :: PRINT #R
:"* DEFINE ENTRY POINT":" ":
"       "&"DEF  "&PN$:" " ::
 NEXT R !162
410 FOR R=0 TO 1 :: PRINT #R
:"* XB EQUATES":" ":"BASIC
EQU  >006A":"CFI    EQU  >12
B8":"FAC    EQU  >834A":"GPL
WS  EQU  >83E0" !069
420 PRINT #R:"NUMREF EQU  >2
00C":"VMBW   EQU  >2024":"VS
BW   EQU  >2020":"XMLLNK EQU
  >2018":" " :: NEXT R !023
430 FOR R=0 TO 1 :: PRINT #R
:"* SET UP WORKSPACE":" ":"W
S    BSS  32":" " :: NEXT R
 !010
440 FOR R=0 TO 1 :: PRINT #R
:"* CHARACTER DEFINITIONS":"
 " :: NEXT R !122
450 FOR I=C TO 159 !241
460 A$="BYTE "&DEF$(I)!164
470 IF I=C THEN A$="CHDATA "
&A$ ELSE A$="       "&A$ !19
2
480 FOR R=0 TO 1 :: PRINT #R
:A$: :: NEXT R !230
490 NEXT I !223
500 H$=STR$(768+8*C)!170
510 FOR R=0 TO 1 :: PRINT #R
:" ":"* ENTRY POINT FOR PROG
RAM":" ":PN$;TAB(8);"LWPI WS
":" " :: NEXT R !101
520 FOR R=0 TO 1 :: PRINT #R
:"* DEFINE CHARACTERS":" ":T
AB(8);"LI   R0,"&H$&RPT$(" "
,8-LEN(H$))&"  " :: NEXT R !
116
530 FOR R=0 TO 1 :: PRINT #R
:"       LI   R1,CHDATA" !10
3
540 H$=STR$(8*(160-C))!010
550 PRINT #R:"       LI   R2
,"&H$&RPT$(" ",10-LEN(H$))!0
91
560 PRINT #R:"       BLWP @V
MBW" !041
570 PRINT #R:" ":"* SKIP OVE
R NEXT DATA":" ":"       B
  @SHOWIT":" " :: NEXT R !13
0
580 FOR R=0 TO 1 :: PRINT #R
:"* DATA FOR CHARACTER DISPL
AY":" " :: NEXT R !154
590 AC$="DSDATA BYTE " :: FO
R P=1 TO LEN(W$):: O=ASC(SEG
$(W$,P,1)):: IF O<30 THEN O=
O+128 !158
600 AC$=AC$&STR$(O)&"," :: I
F P/8=INT(P/8)OR P=LEN(W$)TH
EN AC$=SEG$(AC$,1,LEN(AC$)-1
)ELSE 620 !121
610 FOR R=0 TO 1 :: PRINT #R
:AC$ :: NEXT R :: AC$="
  BYTE " !099
620 NEXT P :: FOR R=0 TO 1 :
: PRINT #R:"       EVEN":""
:: NEXT R !144
630 FOR R=0 TO 1 :: PRINT #R
:"* MORE NECESSARY DATA":" "
:"DEC32  DATA 32":"WIDTH  DA
TA "&STR$(W):"HEIGHT DATA "&
STR$(H):" " :: NEXT R !188
640 FOR R=0 TO 1 :: PRINT #R
:"* R0 = SCREEN POSITION TO
WRITE":"* R1 = CHARACTER TO
```

(See Page 21)

BASIC ASSEMBLY—

(Continued from Page 20)

```
WRITE" !046
650 PRINT #R:"* R2 = ADDRESS
 OF CHARACTER TO":"*       W
RITE":" " :: NEXT R !032
660 FOR R=0 TO 1 :: PRINT #R
:"* R3 = WIDTH":"* R4 = HEIG
HT":"* R5 = CHARACTER COUNTE
R":" " :: NEXT R !070
670 FOR R=0 TO 1 :: PRINT #R
:"* R6 = COLUMN COUNTER":" "
 :: NEXT R !162
680 FOR R=0 TO 1 :: PRINT #R
:"* R7 = ROW POSITION":"* R8
 = COL POSITION":"* R9 = 32
MULTIPLIER":"* R10 = SCREEN
POSITION":" " :: NEXT R !067
690 FOR R=0 TO 1 :: PRINT #R
:"* CALCULATE SIZE OF INSTAN
CE":" ":"SHOWIT MOV  @WIDTH,
R3" !113
700 PRINT #R:"       MOV  @H
EIGHT,R4":"       MPY  R3,R4
":" " :: NEXT R !027
710 FOR R=0 TO 1 :: PRINT #R
:"* GET ROW FROM XB":" ":"
     CLR  R0":"       LI   R
1,1":"       BLWP @NUMREF":"
 " :: NEXT R !077
720 FOR R=0 TO 1 :: PRINT #R
:"       BLWP @XMLLNK":"
   DATA CFI":" ":"       MOV
  @FAC,R7":" " :: NEXT R !00
2
730 FOR R=0 TO 1 :: PRINT #R
:"* GET COL FROM XB":" ":"
     CLR  R0":"       LI   R
1,2":"       BLWP @NUMREF":"
 " :: NEXT R !052
740 FOR R=0 TO 1 :: PRINT #R
:"       BLWP @XMLLNK":"
   DATA CFI":" ":"       MOV
  @FAC,R8":" " :: NEXT R !00
3
750 FOR R=0 TO 1 :: PRINT #R
:"* CALCULATE SCREEN POSITIO
N":" ":"       DEC  R7":"
    DEC  R8":"       MOV  @D
EC32,R9" !248
760 PRINT #R:"       MPY  R7
,R9":"       A    R8,R10":"
     INCT R10":"       MOV
 R10,R0":" " :: NEXT R !218
770 FOR R=0 TO 1 :: PRINT #R
:"* START AT FIRST COLUMN":"
 ":"       CLR  R6":" " :: N
EXT R !026
780 FOR R=0 TO 1 :: PRINT #R
:"* SET ADDRESS OF TEXT":" "
:"       LI   R2,DSDATA":" "
 :: NEXT R !031
790 FOR R=0 TO 1 :: PRINT #R
:"* SET COLUMN COUNTER TO ZE
RO":" ":"       CLR  R6":" "
 :: NEXT R !131
800 FOR R=0 TO 1 :: PRINT #R
:"* PUT CHARACTER IN R1 AND
THEN":"*  PRINT IT":" " :: N
EXT R !021
810 FOR R=0 TO 1 :: PRINT #R
:"PRINT  MOVB *R2+,R1":"
   AI   R1,>6000":"       BL
WP @VSBW":" " :: NEXT R !061
820 FOR R=0 TO 1 :: PRINT #R
:"       INC  R6":"       C
   R6,R3":"       JNE  AGAIN
":"       AI   R0,32" !118
830 PRINT #R:"       S    @W
IDTH,R0":"       LI   R6,0":
" " :: NEXT R !233
840 FOR R=0 TO 1 :: PRINT #R
:"* PREPARE TO DO IT AGAIN":
" ":"AGAIN  INC  R0":"
 DEC  R5" !173
850 PRINT #R:"       CI   R5
,0":"       JNE  PRINT":" "
:: NEXT R !068
860 FOR R=0 TO 1 :: PRINT #R
:"* RETURN TO XB":" ":"RETUR
N LWPI GPLWS":"       B    @
BASIC":" " :: NEXT R !202
870 FOR R=0 TO 1 :: PRINT #R
:"* END OF SOURCE CODE":" ":
"       END":" " :: NEXT R !
032
880 STOP !152
890 PRINT "INSTANCE TOO LARG
E:":" ":"SORRY ABOUT THAT!"
:: STOP !146
```

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

Northeast TI99/4A Home Computer Fair, April 6, Central Middle School, Waltham, Massachusetts. Contact Justin Dowling, The Boston Computer Society, 1 Kendall Square, Boston, MA 02139.

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.

TI99/4A Users Group, UK, Annual Meet, May 11, The Music Hall, The Square, Shrewsbury, England. Contact Stephen Shaw, 10 Alstone Rd., Stockport, Cheshire, England, SK4 5AH.

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.

1992 TI FAIRS

FEBRUARY

Fest-West, Feb. 15-16, Phoenix, Arizona. Contact VAST Users Group, c/o Tom Pfeffer, 116 S. Stellar Parkway, Chandler, AZ 85226.

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.

THE ART OF ASSEMBLY - PART 2

Starting at the Bottom

By BRUCE HARRISON

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In part one, we discussed the two approaches to program structure, Top Down and Bottom Up. In this article we'll provide some "primitive" source code sections to provide services. Please note that, in Assembly, there are about as many ways to do any given thing as there are programmers trying to do it. We'll try to provide the rationale for the way we approach things as we go along. In general, our approach is to minimize memory consumption and maximize speed of execution. Those two don't always go together, but in many cases the most memory-efficient code also executes fastest.

Bear in mind that, for the time being, we're working in the environment of an Option 3 (Load and Run) E/A program. Let's start with the matter of providing Workspace Registers. Many programs contain a source statement like:

```
WS  BSS  32
```

That's fine, but doing this uses 32 bytes of the avilable program memory for your registers. There is an area in low memory designated for User Workspace, at address >20BA. To use that, you can make an equate in the beginning of your source code like this:

```
WS EQU >20BA
```

Now at your program's start point, you can simply LWPI WS, and your registers will be at >20BA, not taking up 32 bytes of program space. (Please note this should not be done when linking from Extended BASIC, unless your program never returns to XB until it's finished.)

Let's quickly move on to another subject, that of a subroutine to clear the screen for you. We've used many different techniques for this, so let's explore a couple of alternatives. One can do it like this:

```
CLS   CLR   R0          Point R0 at screen origin
      LI    R2,SCRWID*24  Load R2 with total
      LI    R1,>2000    make left byte of R1 the space
LOOP  BLWP  @VSBW       Write one space
      INC   R0          Increment screen location
      DEC   R2          Decrement counter
      JNE   LOOP        If not zero, repeat operation
      RT                Return to calling program
```

Here you'll see one of our little tricks. Sometimes when starting a program, we don't know for sure whether we want to operate in Graphics mode or in Text mode. Thus in many places in the program we'll use the mnemonic SCRWID, then at the beginning of the program we'll put a value in for SCRWID through an equate like SCRWID EQU 32 or SCRWID EQU 40. This was really a two-barreled trick, because it also lets the assembler do some math for us. In this case, the assembler will multiply 24, the number of rows on the screen, by the number of characters per row (SCRWID) and thus will load R2 with the correct number of spaces to fill the screen. The above method will work, but won't be as fast as a method using VMBW to write whole screen lines to the screen. We can gain some speed by setting aside a block of 32 or 40 characters' space, writing a space into each of those, then writing 24 such lines to the screen. There would need to be a block of bytes reserved, like this:

```
SCRLI BSS SCRWID
```

There's our friend SCRWID again, this time telling the assembler how many bytes to reserve for a screen line full of characters. Now the code to clear the screen gets more complicated and takes more memory, but executes faster:

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

That block of memory which we set aside as SCRLI can be used for other purposes, as you'll see when we get to some other subroutines. We can, for example, use it to stash strings.

Before we go further with subroutines, we ought to discuss how to properly "nest" them in Assembly. If you're used to programming in BASIC or XB, you know that subroutines may include GOSUBs to other subroutines, and that so long as each ends with RETURN, all will be well.

In Assembly, the calling of a subroutine by BL @SUBNAM will work properly only if the subroutine does not call others. To get around this problem, we establish a "stack" to keep track of our subroutine return addresses. To do this, set up a data area somewhere (perhaps at the very end of your program) which will contain the return addresses for nested subroutines. A simple entry such as:

```
SUBSTK BSS 24
```

This 24 bytes will suffice to hold 12 levels of nesting. The other requirement is to have a pointer to keep track of position in that stack. We simply dedicate R15 to that purpose. Somewhere in the beginning of the program, we insert LI R15,SUBSTK, so that before we call any subroutines, R15 points to the beginning of that stack.

Now in any subroutine that calls others before it returns, which we define as a High level subroutine, we place this instruction at the beginning of the subroutine:

```
      MOV  R11,*R15+
```

That puts the R11 return address in the location pointed to by R15, and makes R15 point to the next word in the stack area. At the end of one High level subroutine, we place the following code:

```
SUBRET DECT R15     Point back to previous stack word
```

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ART OF ASSEMBLY—

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```
        MOV  *R15,R11      Move that word to R11
        RT                 Return.
```

Other high level subroutines can return by a simple B @SUBRET. Note that simple subroutines that do not in turn call others, which we'll call Low level subroutines, need only the RT at their ends to return properly. The stack area can be placed anywhere. We recommended putting it at the very end of a program so it's open-ended, as long as the program doesn't fill all of the computer's memory. Placing it elsewhere is okay so long as you're sure about how many levels of nesting are required. If you underestimate, something important could get overwritten by your stacking.

Let's say that you are writing a high level subroutine which needs to have the screen cleared before it can proceed. The subroutine would look something like this:

```
BIGSUBMOV   R11,*R15+ Stash R11 on SUBSTK
        BL     @CLS   Clear the screen
        (rest of subroutine)
        B      @SUBRET Go to the high level return
```

This assumes there is already another high level subroutine which ends with the code shown above at label SUBRET. By this method, subroutines may be stacked to any number of levels without losing track of the return address of any subroutine.

Now we'll move on to a few more handy subroutines, and introduce the idea of multiple entry points. Let's say you'll need an ability to move strings around in memory, and you'll also need the ability to move groups of bytes that are not organized into strings. (For our purposes, a string is merely a group of bytes where the first byte is the length, and the rest of that many bytes is the string. For example, we might have a string initialized in our data section like this:

```
CPYWRT BYTE  14        Length of text
        TEXT  'Copyright 1991'
```

The first byte is 14, which is the length of the string that follows. Now let's suppose that we want to move that string to another location which we'll call TEMSTR for Temporary String. Assume that at least fifteen bytes of memory have been reserved at that place. We'll be using R9 to point to the origin of the string and R10 to point to the destination address. We can preload registers with the addresses to move from and to, like this:

```
        LI   R9,CPYWRT  Put address of CPYWRT in R9
        LI   R10,TEMSTR Put address of TEMSTR in R10
```

Now that pointers have been set, we can proceed with a BL @MOVSTR, where the subroutine looks like this:

```
MOVSTR  MOVB  *R9+,R4   Get length byte in R4
        MOVB  R4,*R10+  Place that byte at R10 location
        SRL   R4,8      Right-justify length in R4
MOVBTS  MOVB  *R9+,*R10+ Move one byte, inc pointers
        DEC   R4        Decrement length count
        JNE   MOVBTS    If not zero, repeat
        RT              Else return
```

This subroutine uses R4 as a counter for the loop at MOVBTS. We here at Harrison conventionally use R4 and R5 for loop counters or other temporary numbers. But just for a moment let's assume you have a need to move a group of bytes from one place to another but they're not organized as a string, in that there's no length byte at the beginning. Let's say you have 75 bytes to move from location XYZ to location ZXY. Here you can use the label MOVBTS as a second entry point to the subroutine. You'd do it like this:

```
        LI   R9,XYZ     Place source address in R9
        LI   R10,ZXY    Place destination in R10
        LI   R4,75      Number of bytes in R4
        BL   @MOVBTS    Call subroutine MOVBTS
```

This technique has been used many times in our programs, and we've found it very useful, in that it's more efficient in use of memory than having two separate subroutines with such similar functions.

Next, let's look at a very small subroutine which has an important lesson to teach us. Assume that you've got many places in the program that require a single-keystroke entry, such as the answer to a Y/N question. To prepare for such a subroutine, we'll put the equates STATUS EQU >837C, KEYADR EQU >8374 and KEYVAL EQU >8375. Then near the start of our program we'll insure that our key-unit is zero by writing this one line of source code CLR @KEYADR. We'll also need somewhere a byte initialized to the value >20, such as ANYKEY BYTE >20. We can then use the short subroutine like this:

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HORIZON COMPUTER

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```
KEYLOO  CLR   @STATUS Clear the GPL Status byte
        BLWP  @KSCAN  Use utility to scan keyboard
        CB    @ANYKEY,@STATUS Has a key been struck?
        JNE   KEYLOO  If not, try again
        MOV   @KEYADR,R8 Else put key struck in R8
        RT            Then Return
```

You'll notice that there's an extra instruction in there which moves the word at >8374 into R8. The left byte of that word will be zero, and the right byte will be the value of the key struck. Thus the register's value will equal the ASCII code for the keystroke. We do this on purpose because, in most cases after we return from this subroutine, we have to do a series of comparisons to the key struck. Having the key's value already in a register makes that process easier, and moving the key value into a register before exiting the subroutine uses less memory than doing it after return. Suppose we had asked a Yes/No question, and want the default answer to be No. Upon return from the above subroutine, we could have:

```
        CI    R8,89     Is answer upper case Y?
        JEQ   YES       If so, Jump
        CI    R8,121    Is answer lower case y?
        JNE   NO        If not, answer is No
YES     (perform action for Yes)
NO      (perform action for No)
```

The activity at label YES may be a simple branching to some other part of the program, and label NO may be a simple continuation of some process, but that's not important to our point. By moving KEYADR into R8 in the subroutine, we'll save many bytes of memory if this kind of comparison needs to be done each time we've used the subroutine. The point is that the content of a subroutine should be considered very carefully. A small added function like we've shown in the above example can add up to significant savings of bytes by incorporating it into the subroutine instead of having to repeatedly perform the operation outside the subroutine.

In this article, we've just scratched the surface of the subject of subroutines. In the next article, we'll go back to the subject of structure for a bit, and discuss some of the minimum required things to get a program started and ended gracefully. In later articles of this series we'll move into more advanced subroutines, some of which will depend on things we presented here.

MICRO-REVIEWS

Farewell, but before he goes check out TI-Casino and Harrison music disks

By HARRY BRASHEAR

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.

There comes a time in the life of any good column when you're confronted with one of those "good news/bad news" situations; my time has come.

The bad news is that this will be the last mini-review column that will be done by yours truly. I'm sure there are some people out there who have now fallen to their knees to give thanks for small blessings. That's good, because they won't have so far to fall when I give the rest of you the good news. I AIN'T LEAVING! (DARN! PLOP! Well, nothing broken from that height.)

Now I suppose I'm going to have to explain myself: I'm taking a new job with Asgard Software as production manager.

The first person I told that to went into a half-hour tirade about some products that he hadn't received in the expected time from Asgard. That's why I'm taking the job. I didn't ask for it, it was offered and after considerable pacing, thoughtful evaluation, and clearing it with wife, I consented.

The fact is that Asgard, essentially a one man company run by Chris Bobbitt, has gotten too big to be as efficient as it started out. Companies operate on three time factors; on time, a little late, and, too late. By the time you reach the "too late" stage, it really is; people begin canceling orders. If enough orders get canceled, you can get back to the "little late" stage, or even the "on time" stage, but there aren't enough orders to carry you along then because everyone has gone elsewhere. We are going to nip the situation in the "little late" stage and give the TI community better service plus more and better products than ever before. Harry says so!

Needless to say, the community at large will not trust me to give honest evaluations on software products any more. Yes, I could do it, but would you, the user, or you, the software manufacturer, believe me? I doubt it.

In fact, I have been friends with Chris for many years, as I have with Tex-Comp, Notung, Bud Mills Services, MS Software, and many other companies and software authors that service the users. I have treated them all fairly in my evaluations and kept my mouth shut for the most part when their professional jealousy rears its ugly head. (That's when they start banging

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MICRO-REVIEWS—

(Continued from Page 24)

on one another. I have to lend a sympathetic ear and not go back with "he said/she said".)

I have beta-tested their products more than once and made suggestions from a user point of view that I feel have benefited you. In the end, I have been the first to criticize the product, and also the first to say, "I was wrong" when I have been. (A prime example of that is last month's review of the TIM. I swore up and down when it first came out that it would be a disaster. I was wrong, it's a SUPER product.) I think it's for all of the above reasons that Chris has asked me to join him.

Whether I'm here or not has very little bearing on you. You don't need me to say "it's okay" to buy a piece of software from the companies that exist in our community today. With only one or two exceptions, they are all honest, give more product for the money than they should, and are fairly timely in delivery. In return for this service, I believe that more people buy than steal than ever before. The only exception is in the fairware market, which nobody seems to want to pay for. To the fairware authors I say this; GIVE UP! If you have a product that you think is a good one, seek out a distributor and get the royalties you deserve.

I hope this column will continue in the capable hands of someone else. I even hope it will be a better, more informative column. I have often rushed my reviews because of deadlines for other magazines, (and other excuses) and probably didn't get the chance to say much more than "it's okay."

I would very much like to continue writing for MICROpendium, perhaps a monthly column on graphics, which I love to work with, but that's up to the readers. If you write to Micro and let them know how you feel, that could happen, starting in October or November. It's really up to you.

Here's the last of my reviews. It's going to be fast and furious, so read carefully. My apologies to the authors, but at the moment, things are getting a little hectic as my new job starts July first.

★★★★

TI CASINO

If it comes from Ken Gilliland and Notung Software, it just has to be good. If you're into gambling games, get ready for the best ever and the most complete set of games in one package that can be had.

When you first enter the casino, you go to the teller, (Why does she keep winking at me?) and get credited with $1000, or if you have been there before, you can retrieve the amount you finished with the last time you played. After that you go to the lobby and select the game you would like to play.

Casino consists of Black Jack, Poker, Acey Deucey, Keno, Baccarat, Roulette tables, slot machines, and Craps tables. The best part is that you can wander around ALL of the various games accumulating or losing based on the amount of money that you start with. When you finish with a game, you can go back to the lobby to select a new one, or back to the teller to save, cash in, or pay back what you owe the casino.

The entire game is played with the joystick. Selecting the bet amounts, throwing away cards, whatever you want to do, is joystick operated.

The graphics are outstanding and if you don't know how to play one or more of the games, the 44 pages of docs will help you out.

The price of TI Casino is $15, plus $1 for postage and it's worth every cotton pickin' penny of it. Buy it without fail. Send your money to: Notung Software, 7647 McGroarty St., Tujunga CA 91042.

★★★★

MUSIC, HARRISON SOFTWARE

There are two new entries into the now vast library of Harrison Software's music. To explain them, I'm going to pull a piece of the educational file from each one.

1. IL Pastor Fido — Antonio Vivaldi was a rare person. On this disk, we (Harrison Software) have put together a set of six sonatas originally written for the musette, a now-extinct keyboard instrument with a sound somewhat like a reed organ or accordion. This work, titled by Vivaldi as "Il Pastor Fido" (The Faithful Shepherd), Opus XIII, was published in Paris during his lifetime, but has long been forgotten. Published catalogs of his works usually omit Opus XIII. Only two printed copies of the original publication still exist.

2. The Lute and its Composers — Music before Bach. Of all the instruments played during the 17th and 18th centuries, the lute was probably the most practical. This was because it was not only more affordable to the average musician, it was also very portable compared to an 8-foot harpsichord. The Baroque and Transverse flutes were also very popular and easy to learn to play, but the lute, like the modern acoustic guitar, allowed the musician the versatility of having an instrument that allowed him/her to sing while playing. The lute was popular since before the Renaissance.

Bach is probably the most famous of all who composed for the lute, but we have deliberately not featured him in this set in order to give the lesser known composers some exposure. This collection of pieces for the lute can also be easily adapted to the modern acoustic guitar.

Back to me, as usual, the music is pitch-perfect and long. The first one is 85 minutes in length and the second 35 minutes. You'll be able to wipe out an evening with the two of them very easily.

Send $6 for the Vivaldi and $4 for the lute tunes to: Harrison Software, 5705 40th Place, Hyattsville, MD 20781.

A final comment I may.

If you fairware authors archive your products to cut costs, PLEASE, send the doggone archiver and docs along with it. I had a call from a man that had ordered the label maker I reviewed in May. It was archived, and he didn't have the slightest idea of what to do with it or what the problem was.

You would be amazed at how often this happens. I have run into people that have never heard of DM1000 even, that are still using the cartridge disk manager. There are hundreds, perhaps thousands of TIers out there that just haven't been exposed to these things. Give them a break! And by the way, DON'T archive the archiver. Would you believe, I've seen that done too?

Farewell my friends. May the TI live forever. There's no reason why it shouldn't.

99000 in-console accelerator promises big speed gain for TI

The following is an edited transcript of a conference held on Delphi with Don O'Neil, developer of the new 99000 Accelerator for the TI. The device plugs directly into the TI console.

Let me give you all a little background. I announced, at the Lima Fair, my 99000 accelerator for the 99/4A. This new device will install in your console and give you the following features:

- Up to 10 times performance over your current 4A;
- A 129k EEPROM for developing new console ROM's;
- Macrostore;
- And a port to gain access to the 16-bit bus for no-wait state operation on future peripherals.

The card installs over the existing 9900 in the console, after three pins are removed from the 9900. It is a clip on design, easy to install. It is 100 percent compatible with 9900 code and the TI operating system. Gary Bowser of OPA is anticipating taking all of the Macrostore source code he has and stuffing it on the EEPROM , as well as cleaning up the console ROMs and building in a full disk utility program.

The accelerator itself does not have any more additional RAM on board, but with the use of a Horizon RAMdisk with RAMBO, you can have up to 4 megabytes (on both an accelerated, and non-accelerated 4A). My second project also had RAMBO style memory built into it, but let's cover the accelerator first.

I have kept this project secret until we felt it was ready to be released. It will be distributed th ugh both Bud Mills Services and OPA.

About what percentage of our current software will be able to take advantage of this extra speed? And how many might not be able to run at that speed at all?

All software could gain something from the faster speeds, especially programs like Multiplan. However, games will not function if they require loops executed in the CPU for timing. We will not build in any means of slowing it down. If you want to play games, get another console. The speed increase at this point is at least to that of the Geneve, until we do hard core tests on PC Boards, we won't know how much faster we can go.

If we were able to push it to the top, it would be about 4 times faster than the Geneve. If you compare the code running on the 99000 to the code running on the built-in RAM in the 9995, (it would run about twice as fast as the Geneve.) But once you go outside that RAM, things start slowing down, and at times the approach one-quarter the speed of the 99000.

But games should run, right? Just too fast to play?

It depends. If the author used the jmp command and incremented a counter just to waste time for colisions and such, it won't work properly, because the instructions will execute faster, but the sprites would not since they are timed off the VDP. But games that use the VDP for timing will function fine.

Had you considered using the 99110? It has some interesting parallel processing capabilities.

The 99105 and 99110 differ in one way, Macrostore. The 99110 has built in Macrostore for floating point math, and the 99105 does not. Gary Bowser happens to have the source for the 99110's Macrostore stuff (and is trying to get the 99120's) and it will be put in the EEPROM on the card. Also, the 99110 is no longer available from TI, only from surplus vendors. With the EEPROM the 99105 will function exactly as the 99110.

When was the 99120 released?

The 99120 was never released, only prototyped in the lab, it was a 99105 with complete PASCAL kernal written in Macrostore.

Tell us about the peripheral port.

The peripheral port built into the accelerator has only one peripheral it will plug into, and that is a new Flex Cable interface card for the P-Box. This P-Box interface will function exactly as the existing one but will also have some new features that can be added as options whenever you want. The first new thing is the attachment to the console, a sleek 1.5 inches protrudes and a round cable goes out towards the rear to the P-box. On the P-box card, there are two sets of buses: the 8-bit standard TI bus that just drives the P-box (like the old flex cable), and a new 16-bit bus that stays local

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Accelerator priced at $250

The 99105 accelerator for the TI99/4A manufactured by Bud Mills Services was scheduled to be available to end users in late July, according to Bud Mills. The device is also available from OPA.

The card, priced at $250, dramatically increases the power of the TI. The standard TI uses a 9900 chip with a clock speed of 3.3 Megahertz. The 99105 upgrade operates at a clock speed of 12 Mhz. The upgrade is installed in the TI console and requires no soldering. According to its designer, Don O'Neil, the 99105 accelerator increases the speed of the TI by a factor 5. This improvement increases to a 10-fold gain in speed when used with a 16-bit RAM card that fits in the Peripheral Expansion Box.

According to O'Neil, the accelerator is invisible to the TI system.

The PEB RAM interface card is expected to be available in late October or early November. This card is priced at $90 and will serve as a functional replacement for the TI PEB cable. It features battery backed static RAM DSRs (Device Service Routines) for easy upgrading, a smaller, 1 1/2-inch cable connection between the PEB and TI console, uses a 16-bit data bus, has 8 SIMM (Single In-line Memory Module) slots for up to 8 megabytes of RAM expansion, 32K static RAM with zero wait state operation built-in (this replaces existing in-console 32K RAM expansions) and 1 "processor direct slot" for future expansion.

ACCELERATOR—

(Continued from Page 26)

to the card.

On that 16-bit bus are, 32K of O wait RAM, MBP Clock option, 4 8K DSRs (static RAM battery backed like the Horizon RAMdisk), 68881 co-processor option, and 8 1 megabyte IBM-style SIMM (Single In-line Memory Module) slots for RAMBO DRAM (up to 8 megabytes on board), and up to 32 megabytes off-board.

There is also a 16-bit "processor direct slot" for future expansion. This will most likely be used for a 9978 video card. All of the devices on the card that are 16-bit run at a maximum of 6 Mhz, and the P-box at the standard 3 Mhz. On the accelerator card there are two small clips that get clipped to the 9901 and GROMs.

Gary is working on a few programs that will utilize the 9938 and 9958 better, one of which is a Z80 emulator. This will allow us to port over Colecovision, Sega, and Sega Genesis games and programs to the TI with the 9938/58 and accelerator. Once I finish with the basics of the 9938, I will probably go into that. I am anticipating that the new XB, which will have a compiler for it, (will) be a (good) route to go, since BASIC is widely known.

What sort of speed increase can you expect with the new flex card alone?

With the 0 wait 32K, it is about a double, plus with the 68881, it could triple. Of course the Macrostore ROM on the acclerator will allow access to the 68881 through GPL using the same GPL commands. The ROM will check for the 68881 and access it if it is available.

It seems that the 9978 is the ideal choice for the 99105 unless you would like to use a 34020.

The 34020 at this point is a little pricey, but the 34010 is not. I have ideas for a graphics card that would use the 34010, but I don't know. That is too far down the road.

What's the possibility of emulating other computers? Mac, Amiga? CP/M?

Gary already has the CP/M one done. I would like to see a MDOS (Geneve) emulator, as well as a MSDOS (PC) emulator, also an Apple II emulator. They are all possible, but someone has to do it.

The performance of the upgrade will allow reasonable speed in the emulation?

The CP/M emulator currently runs on a 1-1 speed basis with equivalent clock speeds on the Geneve and the CP/M machine. With the 99000 it will be 2-4 times faster.

What drive type does the CP/M emulate? Osborne single density?

I don't know, I do know it is compatible with the Morning Star CP/M card that was made for the TI.

Do you have a timetable for all these projects?

Accelerator in July, P-box card by the Chicago Faire. The rest is unknown at this point.

As for space constraints in the console, do TIM (TI Image Maker by OPA) and accelerator cohabitate well?

Yes they fit fine, also, since the TIM and the Acclerator drain LESS power than their predecessors, there are no fears of damaging anything.

Is there a new XB for this now? (Back to the accelerator)

Just the one that is in the works now in Oregon (Rich GKXB).

What's the time frame for the MDOS emulator?

I have to say probably around Chicago when the P-box card will be available, we may package it with the card or something.

When can I get an accelerator and I/O card and what are the payment plans?

The payment plans are the same as what Bud Mills has now, cash, check, credit card, COD. When the accelerator is shipping we will then take orders, no sooner. We anticipate that by the end of the month. The P-box card will be available the same way.

Will the card be in a clamshell or bare?

Bare. It will have the standard screw clamp like on the existing one, so it will be attached to the P-box.

Will the 32K in-console offered by Bud conflict with the 32K in the new flex card?

Yes, the 32K in-console modification interferes with the physical attachment to the 9900. I suggest you use a different console.

Does the accelerator support speech? With or with out a RAVE card?

Yes, the accelerator will support any sidecar device, you just have to get a longer jumper cable from the extended 16-bit bus to the card edge connector.

Here are addresses and phone numbers for Bud Mills Services and Oasis Pensive Abucators: Bud Millers Services, 166 Dartmouth Dr., Toledo, OH 43614; 419-385-5946: OPA, 432 Jarvis St., Suite 502, Toronto, Ontario, Canada, M4Y 2H3; 416-960-0925.

Newsbytes

Brashear joins Asgard Software

Harry Brashear has joined Asgard Software as of July 1, according to owner Chris Bobbitt. The addition of Brashear is expected to result in significant improvements in the operation of the company, Bobbitt said.

"Since Asgard Software was founded in 1984, I have been responsible for all aspects of the business-end of things. While there have been a parade of assistants and temporary helpers over the years, the vast majority of all marketing, manufacturing, distribution, service, and much product conceptualization, and testing, and some development, have been done by just one overworked person."

"While this system was fine for a company with a few dozen different products, it has just become too much for a mature company with over 130 products, and dozens of new ones under development," he said. "The crush of managing the business has resulted in extensive delays in order fulfillment, product service, our magazine, and every other project and task related to Asgard. Add to this the burden of keeping track of everything, and its plain that something had to be done or soon

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Newsbytes

(Continued from Page 27)

nothing would get done."

Bobbitt said that Brashear will be responsible for almost all order fulfillment, and acting in the capacity as a limited partner.

"Lengthy delays in getting orders and update requests filled has been the biggest problem most people have had in dealing with Asgard. It has cost us many orders and a few friends over the years — but just couldn't be helped. Currently, orders take anywhere from 2 weeks to 8 or more to be filled. Our goal is to have all orders - both new orders, as well as service and catalog requests, and updates, out the door within a week of receiving them," Bobbitt said.

Bobbitt hopes that this level of service will be in place by the end of July.

Bobbitt said that he expects to turn his attention to resuming publication of Reflections/Asgard News. The periodical suspended publication last fall.

"The additional time will also allow me to concentrate more on new product development. Asgard has over a dozen software items sitting on the shelf, only lacking documentation, time and attention to turn them into marketable products," he said.

Bobbitt said that "all customer service will still be handled by me directly - and I will remain Asgard's spokesman. Other then that, I expect nothing less then a complete transformation of what has become one of the largest TI software companies."

Texaments releases new products

Texaments has released several new graphics products and reduced the price of its Artist Companion disks.

Fonts, Frames & Fun is a 3-disk package of 11 fonts, 39 frame borders and 22 instances for use with TI Artist and TI Artist Plus. The price is $12.95.

The Missing Link Font Pak consists of 29 display fonts for use with The Missing Link. The price is $7.95.

The price of most TI Artist Companion disks has been reduced from $9.95 to $7.95. This price in effect for companions disks numbers 2 through 13, all two-disk sets. Companion Disk No. 1 is a five-disk set priced at $17.95.

Buyers should add $3.95 shipping charges in the U.S. and Canada and $8 for overseas.

For more information, contact Texaments at 53 Center St., Patchogue, NY 11772; 516-475-3480, BBS 516-475-6463.

Fest West '92 set for Phoenix

TheTI Fest West '92 will be held Feb. 15-16 in Phoenix, Arizona. The sponsoreing group is the The Valley of the Sun TI User Group (VAST). The site will be at the Days Inn-Phoenix/Camelback, 502 W. Camelback, Phoenix, AZ 85013. The hotel's phone is 800-688-2021.

The fair will be going on from 9 a.m. to 5 p.m. Saturday, Feb. 15, and from 9 a.m. to 3 p.m. Sunday, Feb. 16. Among the door prizes to be presented is a color printer.

Tickets to the event are $5 for both days. Persons under 15 will admitted for free when accompanied by an adult.

For more information, contact the VAST BBS at 602-233-0790; or call H. Knight at 602-938-5446 or R. Rees at 602-869-8145.

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THE TI-BASE USER'S GUIDE — 13

Using Scope

By BILL GASKILL
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This is the final installment of Bill Gaskill's TI-Base User's Guide—Ed

Getting back to the order of the menu that was created in article No. 9 (February 1991), we now construct a command file that allows access to the Find and Display features that TI-Base offers through the SCOPE option.

The FIND program below sets up a very user friendly set of options to search any field in the MICROPEN data base, by a single parameter. To do so, a menu is created that lists each of the field names and allows them to be selected by pressing the number to the left of the field to be searched. When a selection is made the user is prompted to enter up to 12 characters of data that are to be found in the search field.

The "SCOPE" feature in this command file is found in the various DISPLAY FOR statements that do both the searching and the displaying of data. SCOPE options are also available with the AVERAGE, DELETE, PRINT, RECALL, REPLACE and SUM directives. The SCOPE is the set of parameters that you decide to use in the search, that are found to the right of the semi-colon. Anything positioned to the left of the semi-colon constitutes the operation to be performed on or with the data that falls within the SCOPE parameters.

In order to better understand the logic of SCOPE you might mentally substitute the word WHERE every place the word FOR appears. Thus a statement such as one used in FIND would read;

"Display the data in the field names shown WHERE a particular field's data contains only the information that meets the value/text found in HIT"

The various LOCALs in FIND that begin with the letter S are "spacers" used to format the display of the data by pushing it down to the next line for a stacked appearance. Without the spac

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TI-BASE USER'S GUIDE—

(Continued from Page 28)

ers the data would simply be displayed as a continous string and would be difficult to read.

```
* find 06/01/90
* copyright 1990 by Wm. Gaskill
CLEAR
SET HEADING OFF
LOCAL ENTER C 1
LOCAL HIT C 12
LOCAL SA C 2
LOCAL SB C 2
LOCAL SC C 30
REPLACE SA WITH "  "
REPLACE SB WITH "  "
REPLACE SC WITH (30 )

WHILE ENTER <> "7"
CLEAR
WRITE 06,11 "FIND AND DISPLAY"
WRITE 09,11 "ENTER:"
WRITE 11,13 "1 FOR SUBJECT"
WRITE 12,13 "2     SOURCE"
WRITE 13,13 "3     TYPE"
WRITE 14,13 "4     DATE"
WRITE 15,13 "5     PAGE"
WRITE 17,13 "7     RETURN TO MENU"
READCHAR 09,17 ENTER
CLEAR
IF ENTER="7"
RETURN
ELSE
WRITE 12,09 "Use up to 12 characters."
WRITE 16,10 "ENTER DATA:>            <"
READSTRING 16,22 HIT
CLEAR
WRITE 23,02 "SEARCHING FOR:"
WRITE 23,17 HIT
DOCASE
CASE ENTER="1"
DISPLAY ALL SUBJECT SA SOURCE SB DATE P;
AGE SC ;FOR HIT $SUBJECT
BREAK
CASE ENTER="2"
DISPLAY ALL SUBJECT SA SOURCE SB DATE P;
AGE SC ;FOR HIT $SOURCE
BREAK
CASE ENTER="3"
DISPLAY ALL SUBJECT SA SOURCE SB DATE P;
AGE SC ;FOR HIT $TYPE
BREAK
CASE ENTER="4"
DISPLAY ALL SUBJECT SA SOURCE SB DATE P;
AGE SC ;FOR HIT $DATE
BREAK
CASE ENTER="5"
DISPLAY ALL SUBJECT SA SOURCE SB DATE P;
AGE SC ;FOR HIT $PAGE
BREAK
ENDCASE
ENDIF
WRITE 23,1 "End of file. Press <ENTER>.;
           "
READSTRING 23,21 ENTER
ENDWHILE
RETURN
```

User Notes

New Funnelweb in the works

A new version of Funnelweb is in the works. Tony McGovern is working on V4.4 of the program. The current version is 4.32.

Reportedly, McGovern is rewriting the editor from scratch for V4.4. Also, the Disk Review segment of the program may be able to view GIF pictures, as well as being expanded into a complete disk manager. The editor may also incorporate the formatter, instead of being handled as separate functions as is currently the case. A print preview function may also be added.

Multiplan 4.0 software patches

Here are some patches for Multiplan 4.0 by Art Green of RAG Software. Multiplan 4.0 is an upgrade of TI Multiplan for the 4A. The following is by Audrey Bucher of the Pittsburgh Users Group.

A small bug has been discovered in V4.0. This bug occurs when trying to get a directory of a disk with more than 18 files. That is, in Transfer Load, when a filename is typed and then the down arrow is pressed, this should result in a directory listing beginning at the specified file. A patch is given below to fix this error. Here is the procedure:

1. Make a copy of the MP 4.00 disk. Don't use the original disk.

2. Using an editor, type in the patch statements. Type carefully and check your typing. If using the TI-Writer editor, turn word wrap off.

3. Save the patch onto the COPY of the MP disk.

4. Run the RAGPATCH (E/A option 5) or XBPATCH (XBASIC) program.

5. When you see "Patch File Name" on the screen, enter the name you used in step 3 above.

6. Patching is complete when the "Patch

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User Notes

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More?" prompt is displayed.

7. Check that the patched version still works.

8. Repeat steps 1-7 once for STANDARD version and once for the GRAM version.

It is a good idea to read the patch program documentation before you begin patching.

```
STANDARD VERSION PATCH
| Column 1
|
V
*
* TI MULTIPLAN VERSION 4.00
* FIX "TRANSFER LOAD" DIRECTORY LIST
*
CFILE DSK1.MPINTR.>2000 MPINTR LENGTH >2000
*
VERIFY >01E4,'4.00' VERSION #
VERIFY >18BC,>20D1 THIS IS THE ERROR!
*
PATCH >01E4,'4.01' MAKE VERSION 4.1
PATCH >18BC,>38C7 FIX DIRECTORY LIST

GRAM VERSION PATCH
| Column 1
|
V
*
* TI MULTIPLAN VERSION 4.00
* FIX "TRANSFER LOAD" DIRECTORY LIST
* IN THE GRAM VERSION, MPINTR IS IN
* RAM BAND 2, "MPGK" AND IS OFFSET TO
* >6010
*
FILE DKS1.MPGK400 MPINTR
*
VERIFY >61F4,'4.00' VERSION #
VERIFY >78CC,>20D1 THIS IS THE ERROR!
*
PATCH >61F4,'4.01' MAKE VERSION 4.0
PATCH >78CC,>38C7 FIX DIRECTORY LIST
```

Another bug occurs when trying to load a non-existent spreadsheet — an empty file is created. A patch is given below to correct this error.

```
Column 1 STANDARD VERSION PATCH
|
V
*
* TI MULTIPLAN VERSION 4.01 PATCH
* FIX CREATION OF A NULL FILE WHEN "TRANSFER
* LOAD" OF NON-EXISTENT SPREADSHEET.
*
CFILE DSK1.MPINTR,>2000 MPINTR LENGTH >2000
VERIFY >01E4,'4.01' VERSION #
VERIFY >13AE,>119E WRONG WAY BRANCH
PATCH >01E4,'4.02' MAKE VERSION 4.01
PATCH >13AE,>189E JUMP ON CARRY

| Column 1 GRAM VERSION PATCH
|
V
*
* TI MULTIPLAN VERSION 4.01 PATCH
* FIX CREATION OF A NULL FILE WHEN
* "TRANSFER LOAD" OF NON-EXISTENT
* SPREADSHEET.
* IN THE GRAM VERSION, MPINTR IS IN
* RAM BANK 2. "MPGK400" AND IS OFFSET
* TO >6010
*
FILE DSK1.MPGK400 MPINTR LENGTH >2000
VERIFY >61F4,'4.01' VERSION #
VERIFY >73BE,>119E
*
PATCH >61F4,'4.02' MAKE VERSION 4.01
PATCH >73BE,>189E JUMP ON CARRY
```

Readers interested in obtaining a copy of Multiplan 4.0 may write RAG Software, 1032 Chantenay Drive, Gloucester, Ontario K1C 2K9 CANADA. The cost is $10.

Help for hard times with your hard drive

This comes from John L. Teague, of Chandler, Texas. He is a member of the Tyler TI99/4A User Group and the Dallas TI Home Computer User Group. He writes:

Many TI users, as I, have been using the Myarc HFDC and the hard drive for some time, with BOOT on either the Horizon or P-GRAM serving as autoload menu. There are times when it becomes necessary to operate with the hard drive and no Horizon or P-GRAM, and no readily available menu for running the programs on the hard drive.

To allow for such occasional eventualities, I have been operating with BOOT, BOOU and BOOTLOAD in the root directory. This allows one to access BOOT from XB with RUN "WDS1.BOOTLOAD." Since BOOT saved the edited menu configurations back to DSKn, I had been doing the editing on a floppy and transferring the file to WDS1 with MDM5, a real inconvenience; hence a session with SECTOR 140 in searching for the string "Save to DSK" in BOOT and BOOU took me to the third sector from the end in BOOU. I changed DSK to WDS here, and in the second sector from the end, I changed DSK1.BOOT on your hard drive.

Robert Smith, of Carthage, Texas, suggested creating a one-line program, RUN "WDS1.BOOTLOAD," and saving it as "LOAD" on a floppy. This disk is placed in drive 1, and when XB is called for from the TI main screen, the short program runs, and places your WDS1 BOOT menu on the screen in short order.

These two innovations will allow the use of a hard drive with menu and (almost) autobooting, without the Horizon or P-GRAM.

MICROpendium pays $10 for items sent in by readers and used in the User Notes column. Send items to MICROpendium User Notes, P.O. Box 1343, Round Rock, TX 78680.

READER TO READER

☐ Real Dore, 575 Glazier, Ville-Vanier, P.Q. Canada G1M 3A8, writes: I would like to know if someone has been able to modify the Mechatronic EPROMer to use the 12.5V PGM for the EPROM (hardware or software modification, or both). Is there any way to modify the CRU address which is actually at >1900. I own a Myarc 512K card, which is also at CRU >1000, >1900. When I use the EPROMer, I have to remove the 512K card. I also have some problems with the Myarc 512K card when I use the speech synthesizer. There seems to be a timing problem between the card and the synthesizer.

☐ Michael G. Mickelsen, 1549 Webster Lane, Des Plaines, IA 60018: I have a problem with the Myarc hard drive card. The disk manager has several problems which causes backup copies of disks to be made bad. I talked to Myarc at the 1989 Chicago fair and was told I could get a new updated PROM and disk manager by mail. I have sent them an EPROM and several letters. I have yet to receive an answer. I have disk manager V1.29 and EPROM H10. I understand that the latest version is V1.30 with EPROM H11. Is it possible to get a copy of the latest versions of both the disk manager and the EPROM from someone other than Myarc? I have a Mechatronic EPROMer and have access to a PC-PROM burner if the update for the EPROM is on disk.

A partial answer, the latest versions of MDM5 are usually posted on many electronic bulletin boards.

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

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HARDWARE

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