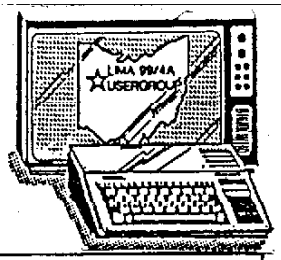
BITS,BYTES&PIXELS

LIMA 99/4A USERS GROUP



OCTOBER 1987 Volume 3 Number 8

ERROR - CORRECTION - ERROR

We goofed! In the cut and paste makeup of our last (Sept 87) issue of BITS BYTES & PIXELS, two paragraphs were pasted out of position, making the article concerning the configuration of FUNNELWEB's User List seem more confusing than it already was. The two bottom paragraphs in the right column of page 2 should instead be positioned immediately after the last paragraph in the left column of page 2. With this change, the article makes much more sense. Your editor regrets this error.

DONE

HOW ACCURATE IS THE 99/4A'S SOUND CHIP?

by Charles Good

Some of the musical programs in our user group's library sound just a bit off, with an occational sour note. This is particularly true of songs played as single notes rather than chords. You don't have to be a music expert to detect these sour notes. Either the programmer programs in the wrong frequency, or perhaps the sound chip is less than totally accurate.

Reading about the CALL SOUND statement in the Users Reference Guide makes one believe that the sound chip is very accurate. The frequency portion of a CALL SOUND statement can have a frequency between 110 and 44733 hertz (cycles per second) suggesting that there are 44623 separate sounds possible! Of course, many of these frequencies are beyond the ability of most monitor speakers or exceed the limits of human hearing, but these numbers suggest the possibility of great accuracy.

The User's Reference Guide on page III7 gives the frequencies for four octaves of of commonly used musical notes. In order to check the accuracy of the musical frequencies listed on page III7 I wrote the following program: 100 PRINT "INPUT FREQUENCY"

```
110 INPUT F
120 CALL SOUND(4000,F,0)
130 GOTO 100
```

I entered various frequencies, including those on page III7 and then used an ARION HU8000 Micron Chromatic Tuner to measure the resulting sounds as they came out of the speaker on my TI 10 inch color monitor. This chromatic tuner is used by musicians to tune stringed instruments, including pianos, and is quite accurate. I played around with different CALL SOUND frequency values and found those that, according to my Chromatic Tuner, were closest to being perfectly "in tune" for all of the notes listed on page III7. The results are shown in the table below. These data were identical on each of the two 99/4A consoles I checked.

Not all frequencies listed on page III7 actually produce the desired note. These are noted in the COMMENTS section of the table. The inaccurately published frequencies are in fact the theoretically correct values, but they are one hertz too large to give the correct sound from the TI sound chip. Music programmers take note! This may be the source of some of the "off" sounds in some of the songs in our group's software library. It is possible that these frequency errors are due to the speaker used in the test rather than the TI sound chip. Maybe a high quality speaker would make these errors disappear, but I doubt it.

For some notes, it is not possible to get a sound that is perfectly in tune. This is particularly true of the higher notes. Values shown in the table show which CALL SOUND frequency gives the closest approximation of a note, and the percent error from perfect "in tune". Again, a beter quality speaker might make these apparent errors disappear, but I doubt it. It is possible, however, that the magnitude of the high frequency errors (10-15% off true "in tune") would be reduced with a better speaker.

Beginning with E above middle C (330 hertz) more than one adjacent frequency number produces EXACTLY the same sound. Thus the apparent tremendous accuracy of the TI sound chip with its 44623 different sounds is a mith. The number of possible sounds is much less. This particular characteristic of the TI sound chip would not be affected one way or another by a higher quality speaker. For A above high C (theoretically 880 hertz) any frequency number between 870 and 884 in a CALL SOUND statement produces the EXACT SAME in tune sound. If you go one higher to 885 you get a distinctly higher sound. You don't need a sound meter to detect this change of sound between 884 and 885. The difference can easily be heard with normal hearing. The above small BASIC program lets you input a new frequency before the old one quits playing so you can listen to frequencies back to back with only an instantaneous pause in between. Try it. Type in the program and RUN it. Input frequencies 878, 879, etc up to 884 and they all sound EXACTLY the same. Then try 885 and notice the difference.

Hopefully the data in this article will help music programmers to appreciate some of the limitations built into the TI sound chip and correct some of the sour notes published on page III7 of the Reference Guide.

NOTE	CALL SOUND frequency, as reported. on page III7 of Users Ref. Guide.	Actual measured CALL SOUND frequencies that generate this note in tune.	COMMENTS
A	110	NA	Volume too soft to meter.
A#	117	NA	" " " " "
B	123	NA	" " " " "
C(low C)	131	131	
C#	139	138	Off by 1HZ, also 5% flat
D	147	147	
D#	156	156	5% sharp
E	165	165	
F	175	175	5% sharp
F#	185	185	
G	196	196	
G#	208	207	Ref Guide high by 1HZ
A	220	220	5% sharp
A#	233	233	
B	247	247	
C(mid C)	262	261	Ref Guide high by 1HZ
C#	277	277	
D	294	293	Ref Guide high by 1HZ
D#	311	311	
E	330	329-330	
F	349	349-350	
F#	370	369	Ref Guide high by 1HZ
G	392	392-393	
G#	415	415-416	
A	440	440-441	
A#	466	466	
B	494	491-491	Ref Guide high by >=1HZ
C(high C)	523	522-523	
C#	554	553-555	
D	587	584-587	
D#	587	584-587	
E	659	656-659	
F	698	697-701	
F#	740	738-743	
G	784	780-784	
G#	831	826-831	
A	880	878-884	
A#	932	929-935	
B	988	986-994	
C	1047	1041-1050	
C#	1109	1102-1112	
D	1175	1172-1183	5% sharp
D#	1245	1236-1249	
E	1319	1309-1323	
F	1397	1389-1406	
F#	1480	1462-1481	10% flat
G	1568	1565-1586	5% sharp
G#	1661	1657-1681	10% sharp
A	1760	1734-1761	15% flat

DONE

INSTALLING EXTENDED BASIC INSIDE YOUR CONSOLE

by John F. Willforth
West Penn 99'ers

(Ed. Note: This article is reprinted from the July 87 issue of the newsletter of the West Penn 99'er Club. It has been our own experience that cleaning the console, particularly the cartridge port will usually solve problems encountered when using the XB module. Instructions for doing this were published in the Jan 87 issue of Bits Bytes & Pixels. It has also been our experience that a GRAM KRACKER with its gold plated contacts will often run extended basic reliably.)

For many of us there has been much frustation over the last several years about "HANG-UPS" that occur to the TI 99/4A using extended basic, just as the most critical part of a program or game is reached. There are those who would lead you to believe that the power supply has been the culprit in the majority of the console locking in their club. This may have been the problem experienced in the microcasm they are in. I have experienced the problems with inconsistent and noisy D.C. voltages issued from the TI supplies also. A few months ago I ran through 5 straight VDP memory problems in a row, and could have made the statement that most if not all TI console problems will be found to have defective 4116 dynamic RAM chips. This would have been absurd! I'm making this statement only to try to reassure you that of all possible causes for console hangs, the GROM connection/cartridge connection is far and away the most common, and in particular the mating (or lack of) between the Extended Basic and Grom Connection, is the greatest culprit. The purpose of this article is to assist those of you who would like to give the Extended Basic module on board.

-----DO THE FOLLOWING AT YOUR OWN RISK!

PARTS; * 1' ribbon cable (36 lead) or 2 lengths of 25 lead cable.
* 1 Extended Basic module (shell removed)
* 1 double pole single throw slide switch (for enabling/disabling Extended Basic)
* Solder iron, wire cutters, etc.

I'm not going to get into the details for I feel if by now that you can't remove your own CPU from your console, you shouldn't be attempting this. Get someone who can, remove the GROM Connector from the unit, and attach the ribbon cable to the pins of the rear of the circuit card that the GROM connector is attached. Attach all but pins 4 and 6 to ribbon cable. 4 and 6 are unused here. Now, keeping the length of the wire to less than 8" attach the other ends of the corresponding wire to the Extended Basic card edge connector leads, remembering the relationship between the two. i.e. pin 1 must go to pin 1, 2 to pin 2, and so on (not 4 or 6). before you attempt any further

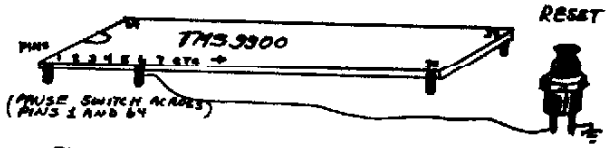
NEXT PAGE

modification to the machine, reassemble and see if Extended Basic comes up on the menu, and still functions, SIZE, ACCEPT AT, etc. If you are still functional, continue.

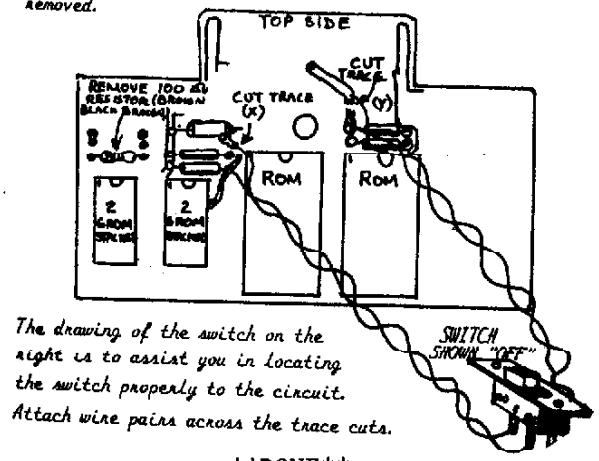
Remove the 100 ohm resistor indicated, and cut the two traces where shown. Now you may solder 4 equal lengths of wire to the switch (not longer than 10" in length). Attach two of the wires across the cut in the trace (x) and the other two across (y), making sure that the pairs are on the same switch pole set. Now, test the results again.

If the Extended Basic works when the switch is closed, and the cartridge slot will accept cartridges (meaning that a variety of GROM/ROM cartridges will function), when the switch is open, then you are almost home. Mount the switch in a convenient location and insulate the bottom of the Extended Basic cartridge and locate the TOP RF SHIELD to the left of the GROM connection. Reassemble. It would also be of benifit to you at this time to install a reset button across pin 6 of the CPU chip and ground. Trust me.

The reset switch will be particularly useful, in that you will now not be able to reset the machine by inserting the Extended Basic cartridge. You may find that without the RESET switch, you will have to turn the console power switch off and then on to begin operation after switching from basic to Xbasic or other cartridges. This is an easy option to install with a momentary contact switch across pin 6 on the CPU chip (TMS9900) and ground. Reference the first drawing.



The view below is here to help you find the two traces that must be cut, and the 100 ohm resistor that must be removed.



The drawing of the switch on the right is to assist you in locating the switch properly to the circuit. Attach wire pairs across the trace cuts.

DONE

QUICKLOAD

The CENTRAL WESTCHESTER 99er's sent us a along with their newsletter this month a disk with a program called QUICKLAOD. This is a FAST extended basic program loader with room for comments, and is worth looking at even if you already have a favorite XB load program. Our thanks go to the author Robert Amenta and Central Westchester group for this. In the past our group has sent out software to other groups with our newsletter. I think this is a good way to quickly share the wealth, especially if a good program has been written by a member of a local group. Maybe more user groups will pick up on this idea.

DONE

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HARDWARE FOR THE TI

by J. Peter Hodie

(Ed. Note: The following article is taken from the August 87 issue of the Boston Computer Society TI User Group Meeting Newsletter. It is the best comparison of available TI99/4A hardware I have seen to date. Most of this hardware will be available for sale at the upcoming Chicago TI Fare. If you do get a chance to go to the fair, BRING MONEY! You will probably get a chance to actually see everything that has ever been made for the TI, software and hardware, including the hardware described in Hoodie's article. Often you can purchase for less than advertised prices.)

Rather than discuss the virtues and pit falls of the 9640, this month I am going to go over the details of the standard hardware available to 99/4A owners. There seems to be a great deal of confusion of the capabilities of the various peripheral cards, hopefully this will clear some of that up (more likely it will just make things worse).

DISK CONTROLLERS

There are 3 main controllers out there, made by TI, CorComp, and Myarc. They all vary in their capabilities, so let me first list the different features a disk controllr can have. All disk controllers can support double sided disk drives. This means that if you have drives that can store data on both sides of the diskette, any of these controllers is capable of using that feature. Many disk drives can support what is called "double density." This is a method for packing double the data onto a disk. Most disk drives these days are 40 track, which is standard, while some can support 80 track. 80 track means that you can store twice the amount of data as on a 40 track disk. However 80 track drives usually require more expensive diskettes because the data is so compact on the surface of the disk. Disk drives vary in the time it takes them to access data. The slowest speed is about 20 milliseconds (ms). There are drives that are as fast as 3 ms, although these are more expensive.

The TI DISK CONTROLLER can handle up to 3 double sided, single density, 40 track, 20 ms step time disk drives. In otherwords, the TI disk controler is the bottom of the line in all respects. RYTE DATA currently has availaduble an EPROM set for the TI disk controller that will allow it to access 80 track drives, however I do not know enough about the product at this time to make any comments on it.

The CORCOMP disk controller can handle up to 4 double sided, double density, 40 track, 20 ms to 6 ms step time drives. This means that you can have one more drive than the TI controller, and each drive can hold double the data. The drives can also be accessed faster. The CORCOMP disk controller has some nice extra features including a good disk manager (it was the basis for DM1000), and a number of extra CALLs. The disk controller literally takes over the computer on power up, however, which causes some compatibility problems. This can be fixed by purchasing a new EPROM set from MG for about $35.

The MYARC disk controller can handle up to 4 double sided, double density, 40 or 80 track, 20 ms to 6 ms step time drives. This is essentially the same capability as the CorComp card. You can only use 80 tracks if you purchase a special EPROM from MYARC for about $50 that suppports 80 track drives. The MYARC disk controller comes with probably the best disk manager program for the /4A, and has a built in CALL DIRectory command to catalog disks from BASIC and Extended BASIC. Also, the MYARC disk controller is noticably faster then the others because of the approach MYARC took in designing the card.

RS232 CARDS

There is very little to say in this area. There are cards available from TI (very rare these days), CORCOMP and MYARC. They all have 2 RS232 ports (Ed. Note: You need a "Y" cable to use both serial ports with the TI card. I don't know if the other cards need such a "Y" cable.) and 1 parallel (PIO) port. The CORCOMP will not work with the MYARC print spooler (more below on that), whereas the MYARC and TI will. The MYARC suports some extra software commands to allow for 19.2K baud (the others stop at 9600, real slow (grin)), inverted busy in software rather than hardware, and some other details. MYARC also has an EPROM that will make the PIO port act like the thermal printer (TP) if you need something like that. However, really all these cards are petty much the same. Most people prefer the TI card, and shun the CORCOMP. The MYARC is probably the best and most readily available these days.

MEMORY CARDS AND RAM DISKS

There are more memory cards out there than almost anything else. TI made a 32K memory card. That was it. Most RAM disks, but not all, replace this card. If you just want a 32K card, they are available from MYARC and CORCOMP and there is no difference worth discussing between these two cards. They both seem to work reliably. (Ed. Note: Used TI 32K cards can often be obtained cheaply these days as users upgrade to MYARC or CORCOMP big-memory cards and no longer have use for their old TI card. Watch the newsletters for ads.) Foundation made a 128K memory card that replaced the 32K memory expansion and gave you an extra 96K of memory that could function as a RAM disk. Unfortunately their RAM disk software was terrible. Quality 99 software and others have since released new software that makes this card acceptable, however since it is out of production it can't be strongly recommended.

MYARC makes a memory card which replaces the 32K memory card, and comes with either 256K or 512K of memory. The memory beyond the first 32K can be divided between a RAM disk and a print spooler, although the print spooler will not work with the CorComp PIO port. For an aditional $50

or so, you can get MYARC Extended BASIC II, which is a much faster, more powerful, and slightly buggier version of Extended BASIC that will work with the Foundation card or the MYARC memory card. CORCOMP makes a 256K and 512K card, and these both function as RAM disks. I don't know much about these cards, except that they are reported to work quite well, so again I will make no comments.

The HORIZON RAM DISK comes either as a kit or assembled, and provides a very reliable 90K or 180K RAM disk. It can also be upgraded to 256K. It supports a very powerful operating system including replacing the TI title screen with a custom menu of programs. The HORIZON RAM DISK does not replace the 32K card and thus can be used along with a MYARC or Foundation RAM disk. (Ed. Note: If you are NOT using the CorComp disk controler it is possible to use as many HORIZON RAM DISK cards as your "P" box will hold, assigning each card a separate drive number. As I understand, it is only possible to use one HORIZON card with a CorComp controler. I have 3 180K cards in my "P" box, giving me 540K of battery backed up memory storage instantly available every time I turn on the computer. I don't have to use floppy's very often since my most used software is on the RAM disks. Multiple HORIZON cards will work even if you already have the maximum number of floppy drives your controler card is designed to handle. With a TI card you can have 3 floppy drives named DSK1-3 and additional HORIZON RAM DISKS named DSK4-7.)

PRINT SPOOLERS

Your printer is much slower than your computer. Your computer could print a full TI writer document in a few seconds. Your printer couldn't. A print spooler is a device that accepts your document as fast as the computer can send it, and then the spooler sends it to the printer, while you can continue to use your computer for other things. The first print spooler was part of the CORCOMP TRIPLE TECH card. It has 64K of memory and ran independently of the computer. The MYARC print spooler is part of the MYARC 256K and 512K cards and can be anywhere from 1K to 400K. The MYARC print sppooler is software driven, so that if your computer fails while the spooler is printing, your document probably won't be finished. Further more, some pprograms lock out the MYARC print spooler so that it can't print at all until you exit that program. However, for most uses the MYARC spooler is adequate.

There is another class of print spoolers, which are separate hardware devices that go outside your expansion box. These will work with any computer. They are usually 128K of memory, and run about $90 or so. These work quite well, and if you don't want the added features of the Triple Tech card (clock and speech synthesizer in the box) or the power of the MYARC memory cards, these are a very economical solution.

SPEECH IN THE BOX

There are two ways to get the speech synthesizer into your expansion box. You can either get th CORCOMP TRIPLE TECH CARD with its print spooler and clock, or the RAVE 99 speech card. Both cards require that you already have the speech synthesizer as they both just provide a connector for it. The TRIPLE TECH CARD will not work with the 9640. The RAVE card will, however it did not work well with all speech synthesizers, at last check. RAVE has been good about trying to resolve this problem, and since their card is only about a third the cost of the TRIPLE TECH card it does provide a reasonable alternative. (Ed. Note: If you are handy with a soldering iron it is possible to put your speech synthesizer permanantly inside your 99/4A console. Back issues of Northwest 99er News and other newsletters tell you how.)

CLOCKS

There are several clock cards available, all radically different. The MBP (MPB??) clock card is one of the earliest, and works well. The CORCOMP TRIPLE TECH clock is probably the most popular, although CORCOMP also makes a standalone clock for those who don't want the entire TRIPLE TECH card. John Clulow recently designed a memory card that you can build which includes a clock similar to the MBP. The problem with all these clocks is that there is almost no software that supports them. Bulletin board programs can use them, but mostly you'll have to write your own software to handle these clocks. (Ed. Note: "Checkbook Writer" by Mel Nomina has a provision for using the TRIPLE TECH clock to automatically date check records. This public domain software can be obtained free from the Lima (Ohio) Area User Group by sending a disk and return postage to P.O. Box 647, Venedocia OH 45894.)

IBM STYLE KEYBOARDS

There are two sources for IBM keyboard interfaces. The first is from RAVE 99, and they are quite well established now. They have suppport for special Multiplan and TI-Writer modes to minimize key strokes, and installation is straightforward. The second source is ML Systems. They supply only a key board interface, you supply the keyboard. The RAVE folks will supply you with a keyboard, if you wish. The ML Systems supports keyboard macros, where one keystroke can send up to 12 key strokes to the computer. This is a powerful feature, however if you wish to customize the macros you must pay an additional $20. There have been reports that the ML Systems interface is less reliable than the RAVE, however I suspect that this is due to the keyboard being used and not the interface. Because the ML systems interface is considerably less expensive than the RAVE, it might be worth taking the chance. The one thing I can't stand about the ML Systems is that it uses the ESCape key to repplace the function key on the /4A, whereas the RAVE uses the ALTernate key. The RAVE choice makes much more sense, using the ESCappe key is horribly awkward. Look at an IBM keybboard sometime and you'll see what I mean. **DONE**

TIPS FROM THE TIGERCUB

$45

TIGERCUB SOFTWARE
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Over 130 original programs in Basic and Extended Basic, available on cassette or disk, now reduced to just $2.00 each, plus $1.50 per order for cassette or disk and PP&M. Cassette programs will not be available after my present stock of blanks is exhausted.
Descriptive catalogs, while they last, $1.00 which is deductable from your first order.

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NUTS & BOLTS (No. 1), a full disk of 100 Extended Basic utility subprograms in merge format, ready to merge into your own programs. Plus the Tigercub Menuloader, a tutorial on using subprograms, and 5 pages of documentation with an example of the use of each subprogram. Reduced to $15.00 postpaid.
NUTS & BOLTS NO. 2, another full disk of 108 utility subprograms in merge format, all new and fully compatible with the last, and with 10 pages of documentation and examples. Also $15 postpaid.

```
**********************************
* NUTS & BOLTS #3 is now         *
* ready, another full disk       *
* of 140 new merge-format        *
* utility subprograms, all       *
* compatible with the pre-       *
* vious. With 11 pages of        *
* documentation, $15 ppd.        *
**********************************
```

TIPS FROM THE TIGERCUB, a full disk containing the complete contents of this newsletter Nos. 1 through 14, 50 original programs and files, reduced to $10 ppd.
TIPS FROM THE TIGERCUB VOL. 2, another diskfull, complete contents of Nos. 15 through 24, over 60 files and programs, also just $10
TIPS FROM THE TIGERCUB VOL. 3, another 62 programs, tips and routines from Nos. 25 through 32, $10 postpaid.
TIPS FROM THE TIGERCUB VOL. 4, another 48 programs and files from issues 33 through 41, also $10 postpaid.

Here is a versatile printer utility which will accept all printer control codes, print in 1 to 5 columns with choice of column separation and margin width, allow alternate margins and pause at end of page to turn paper over, and will load and print a diskfull of files one after another. It is set up for the Gemini 10X and may require modification for other printers.

```
100 DIM M$(400),F$(50)
110 GOTO 150
120 K,ST,SET,S,P$,P,CL,DW$,S
S$,I$,D$,E$,NC,CW,TC,TA,TX,A
V,CS,S$,LT,A$,LSP,LP,RM,OK$,
QQ$,X,F$(),SL,F,IP,M$(),T$,F
LAG,J,PP,LT$
130 CALL CLEAR :: CALL KEY :
: CALL COLOR :: CALL SCREEN
:: CALL SOUND
140 !@P-
150 CALL CLEAR :: CALL KEY(3
,K,ST):: ON WARNING NEXT
160 FOR SET=0 TO 14 :: CALL
COLOR(SET,2,8):: NEXT SET ::
 CALL SCREEN(5)
170 DISPLAY AT(3,6):"TIGERCU
B PRINTALL": :TAB(7);"Copyri
ght 1987":TAB(6);"Tigercub S
oftware" !programmed by Jim
 Peterson
180 DISPLAY AT(12,1):"May be
 distributed without":"restr
iction providing that":"no p
rice or copying fee is":"cha
rged."
190 DISPLAY AT(18,7):"TURN P
RINTER ON!"
200 DISPLAY AT(20,8):"PRESS
ANY KEY" :: DISPLAY AT(20,8)
:"press any key" :: CALL KEY
(0,K,S):: IF S=0 THEN 200 EL
SE CALL CLEAR
210 DISPLAY AT(12,1):"PRINTE
R DESIGNATION?" :: ACCEPT AT
(14,1)BEEP:P$ :: IF POS(P$,"
.LF",1)=0 THEN P$=P$&".LF"
220 ON ERROR 230 :: OPEN #1:
P$,VARIABLE 255 :: ON ERROR
STOP :: PRINT #1:CHR$(27);"@
" :: CALL CLEAR :: GOTO 240
230 DISPLAY AT(20,1):"CANNOT
 OPEN PRINTER!" :: RETURN 21
0
240 DISPLAY AT(12,1):"PRINT
SIZE?": :" (1) PICA":" (2)
 ELITE":" (3) CONDENSED"
250 ACCEPT AT(12,13)VALIDATE
("123")SIZE(1):P :: PRINT #1
:CHR$(27);"B";CHR$(P);
260 !The values 80, 96 and 1
36 in the next line are the
maximum number of pica, elit
e and condensed characters p
er line on Gemini 10X
270 !Change as necessary for
 your printer!
280 CL=(P=1)*80+(P=2)*96+(P=
3)*136 :: CL=ABS(CL)
290 DISPLAY AT(12,1)ERASE AL
L:"DOUBLE-WIDTH? (Y/N) N" ::
 ACCEPT AT(12,21)SIZE(-1)VAL
IDATE("YN")BEEP:DW$ :: IF DW
$="Y" THEN PRINT #1:CHR$(27)
;"W";CHR$(1);:: CL=CL/2
300 DISPLAY AT(12,1)ERASE AL
L:"SUPERSCRIPT? (Y/N) N" ::
ACCEPT AT(12,20)SIZE(-1)VALI
DATE("YN")BEEP:SS$ :: IF SS$
="Y" THEN PRINT #1:CHR$(27);
"S";CHR$(0);
310 DISPLAY AT(12,1)ERASE AL
L:"ITALICS? (Y/N) N" :: ACCE
PT AT(12,16)VALIDATE("YN")SI
ZE(-1)BEEP:I$ :: IF I$="Y" T
HEN PRINT #1:CHR$(27);"4";
320 DISPLAY AT(12,1)ERASE AL
L:"DOUBLE-STRIKE? (Y/N) Y" :
: ACCEPT AT(12,22)VALIDATE("
YN")SIZE(-1)BEEP:D$ :: IF D$
="Y" THEN PRINT #1:CHR$(27);
"G";
330 IF P<>3 AND P<>4 THEN DI
SPLAY AT(12,1):"EMPHASIZED?
(Y/N) Y" :: ACCEPT AT(12,19)
VALIDATE("YN")SIZE(-1)BEEP:E
$ :: IF E$="Y" THEN PRINT #1
:CHR$(27);"E";
340 DISPLAY AT(12,1)ERASE AL
L:"NUMBER OF COLUMNS? (1-5)"
 :: ACCEPT AT(12,26)VALIDATE
("12345")SIZE(1)BEEP:NC
350 DISPLAY AT(12,1):"COLUMN
 WIDTH (NUMBER OF": :"CHARAC
TERS?" :: ACCEPT AT(14,13)VA
LIDATE(DIGIT)BEEP:CW
360 TC=NC*CW :: TA=CL-TC ::
TX=TC+NC*2-2
370 IF TX<=CL THEN 390 :: DI
SPLAY AT(10,1):STR$(NC)&" co
lumns of "&STR$(CW)&" charac
ters":"plus 2-column spacing
 equals"
380 DISPLAY AT(20,1):STR$(TC
)&" characters; maximum":"av
ailable in print size":"sele
cted is "&STR$(CL)&".":"****
Please reselect****" :: GOTO
 240
390 IF NC=1 THEN 410 :: AV=I
NT(TA/(NC-1)):: DISPLAY AT(1
2,1)ERASE ALL:"COLUMN SEPARA
TION?":"MINIMUM 2":"MAXIMUM
"&STR$(AV)&" AVAILABLE ":"2"
400 ACCEPT AT(15,1)VALIDATE(
```

```
DIGIT)SIZE(-2)BEEP:CS :: IF
CS<2 OR CS>AV THEN 400 ELSE
S$=RPT$(" ",CS)
410 TA=TA-CS$(NC-1):: IF TA<
2 THEN 450
420 DISPLAY AT(12,1)ERASE AL
L:"LEFT MARGIN WIDTH?": :"MA
XIMUM "&STR$(TA)&" AVAILABLE
" :: ACCEPT AT(12,20)VALIDAT
E(DIGIT)BEEP:LT :: IF LT>TA
THEN 420
430 DISPLAY AT(12,1):"ALTERN
ATING LEFT/RIGHT": :"MARGIN?
 (for pages to be":"later re
produced on both":"sides) (Y
/N) N"
440 ACCEPT AT(16,14)VALIDATE
("YN")SIZE(-1):A$
450 LSP=12 :: DISPLAY AT(10,
1):" ":" ":"LINES PER PAGE?
60":" ":" ":" ":" " :: ACCEP
T AT(12,17)VALIDATE(DIGIT)SI
ZE(-3):LP :: IF LP<70 THEN 4
90
460 DISPLAY AT(12,1):"LINE S
PACING - 72 INCH" :: DISPLAY
 AT(11,16):"__" :: ACCEPT AT
(10,16)VALIDATE(DIGIT)BEEP:L
SP
470 IF LP/(INT(72/LSP))>11.5
 THEN DISPLAY AT(20,1):"WON'
T FIT!" :: GOTO 450
480 PRINT #1:CHR$(27);"A";CH
R$(LSP);
490 RM=TA-LT
500 DISPLAY AT(12,1)ERASE AL
L:STR$(NC)&" columns of":STR
$(CW)&"-character width":"le
ft margin of "&STR$(LT)&" sp
aces"
510 DISPLAY AT(15,1):STR$(LP
)&" lines per page":"with "&
STR$(LSP)&"/72 line spacing"
520 DISPLAY AT(17,1):STR$(CS
)&" spaces between columns":
"right margin of "&STR$(RM)&
" spaces": :"OK? (Y/N) Y"
530 ACCEPT AT(20,11)VALIDATE
("YN")SIZE(-1)BEEP:OK$ :: IF
 OK$="N" THEN 240
540 DISPLAY AT(12,1)ERASE AL
L:"PAUSE AT END OF PAGE? N"
:: ACCEPT AT(12,23)VALIDATE(
"YN")SIZE(-1):QQ$
550 DISPLAY AT(1,1)ERASE ALL
:"INPUT FILENAMES TO BE":"PR
INTED.":"PRESS ENTER WHEN DO
NE"
560 X=X+1 :: DISPLAY AT(X+3,
1):"FILENAME? DSK" :: ACCEPT
 AT(X+3,14)SIZE(-12)BEEP:F$(
X)
570 IF F$(X)="" THEN X=X-1 :
: GOTO 600 ELSE F$(X)="DSK"&
F$(X)
580 ON ERROR 590 :: OPEN #2:
F$(X):: CLOSE #2 :: GOTO 560
590 ON ERROR STOP :: CALL SO
UND(1000,110,0,-4,0):: DISPL
AY AT(20,1):"CANNOT OPEN "&F
$(X):: X=X-1 :: RETURN 560
600 SL=1
610 F=F+1 :: IF F>X THEN 700
 :: ON ERROR 620 :: OPEN #2:
F$(F),INPUT :: DISPLAY AT(22
,1):"READING ";F$(F):: ON ER
ROR STOP :: GOTO 630
620 CALL SOUND(1000,110,0,-4
,0):: DISPLAY AT(20,1):"COUL
D NOT OPEN "&F$(F):: STOP
630 FOR IP=SL TO LP$NC :: LI
NPUT #2:M$(IP):: IF LEN(M$(I
P))=0 THEN 670 :: IF NC>1 AN
D POS(M$(IP),CHR$(13),1)<>0
THEN M$(IP)=SEG$(M$(IP),1,LE
N(M$(IP))-1)
640 IF ASC(M$(IP))>126 OR AS
C(M$(IP))<32 THEN IP=IP-1 ::
 GOTO 680
650 IF LEN(M$(IP))<=CW THEN
670 :: T$=SEG$(M$(IP),1,CW):
: CALL SOUND(1000,110,0,-4,0
):: DISPLAY AT(12,1):M$(IP);
" OVER";CW;"CHARACTERS":"TRU
NCATED TO ";T$:"OK?"
660 CALL KEY(3,K,S):: IF S=0
 THEN 660 ELSE IF K<>89 THEN
 STOP ELSE M$(IP)=T$
670 M$(IP)=M$(IP)&RPT$(" ",C
W-LEN(M$(IP)))
680 IF EOF(2)=1 THEN CLOSE #
2 :: SL=IP+1 :: GOTO 610
690 NEXT IP :: IF EOF(2)=1 T
HEN CLOSE #2 :: GOTO 720 ELS
E GOTO 720
700 ON ERROR 710 :: FLAG=1 :
: FOR J=IP+1 TO NC*LP :: M$(
J)="" :: NEXT J :: GOTO 720
710 STOP
720 PP=PP+1 :: IF PP/2=INT(P
P/2)AND A$="Y" THEN LT$=RPT$
(" ",RM)ELSE LT$=RPT$(" ",LT
)
730 FOR J=1 TO LP :: ON NC G
OSUB 750,760,770,780,790 ::
NEXT J :: PRINT #1:CHR$(12):
: SL=1 :: IF F>X THEN STOP E
LSE IF QQ$="N" THEN 630
740 DISPLAY AT(24,1)BEEP:"PR
ESS ANY KEY TO CONTINUE" ::
CALL KEY(0,K,S):: IF S=0 THE
N 740 ELSE DISPLAY AT(24,1):
"" :: GOTO 630
750 PRINT #1:LT$&M$(J)&CHR$(
10):: RETURN
760 PRINT #1:LT$&M$(J)&S$&M$
(J+LP)&CHR$(10):: RETURN
770 PRINT #1:LT$&M$(J)&S$&M$
(J+LP)&S$&M$(J+LP*2)&CHR$(10
):: RETURN
780 PRINT #1:LT$&M$(J)&S$&M$
(J+LP)&S$&M$(J+LP*2)&S$&M$(J
+LP*3)&CHR$(10):: RETURN
790 PRINT #1:LT$&M$(J)&S$&M$
(J+LP)&S$&M$(J+LP*2)&S$&M$(J
+LP*3)&S$&M$(J+LP*4)&CHR$(10
):: RETURN
```

This is an improved version of the math program in Tips #36.

```
100 CALL CLEAR :: RANDOMIZE
110 B=INT(5*RND+2):: IF B=B2
 THEN 110 ELSE B2=B
120 F=INT(5*RND+2):: IF F=F2
 THEN 120 ELSE F2=F
130 D=INT(5*RND+2):: IF D=D2
 THEN 130 ELSE D2=D
140 X=F*B*D
150 BB=INT(5*RND+2):: IF BB=
BB2 OR BB=B THEN 150 ELSE BB
2=BB
160 DD=INT(5*RND+2):: IF DD=
DD2 OR DD=D THEN 160 ELSE DD
2=DD
170 F=F*BB*DD
180 DISPLAY AT(3,1)ERASE ALL
:"IF";B;"BOYS CAN CATCH";X;"
FROGS IN";D;"DAYS,"
190 DISPLAY AT(6,1):"HOW MAN
Y FROGS CAN";BB;"BOYS":"CATC
H IN";DD;"DAYS?"
210 ACCEPT AT(7,19):Q
220 IF Q=F THEN DISPLAY AT(9
,1):"THAT'S RIGHT!" :: GOTO
110
230 DISPLAY AT(9,1):"NO, THA
T'S WRONG."
240 DISPLAY AT(11,1):"IF";B;
"BOYS CAN CATCH";X;"FROGS IN
";D;"DAYS"
250 DISPLAY AT(13,1):"THEN O
NE BOY CAN CATCH";X/B;"FROGS
 IN";D;"DAYS"
260 DISPLAY AT(15,1):"AND ON
E BOY CAN CATCH";X/B/D;"FROG
S IN ONE DAY."
270 DISPLAY AT(17,1):"SO, IF
 ONE BOY CAN CATCH";X/B/D;"F
ROGS IN ONE DAY,"
280 DISPLAY AT(19,1):"THEN";
BB;"BOYS CAN CATCH";X/B/D*BB
;"FROGS IN ONE DAY"
290 DISPLAY AT(21,1):"AND";B
B;"BOYS CAN CATCH";X/B/D*BB*
DD;"FROGS IN";DD;"DAYS."
300 DISPLAY AT(24,1):"PRESS
ANY KEY" :: CALL KEY(0,K,S):
: IF S=0 THEN 300 ELSE 110
```

Here's an idea for an unusual title screen -

```
100 CALL CLEAR :: FOR SET=1
TO 8 :: CALL COLOR(SET,1,1):
: NEXT SET :: CALL CHAR(100,
"0",101,"0")
110 X$(0)="4043241818244202"
 :: X$(1)="4021261818648402"
 :: X$(2)="2020131C38C80404"
 :: X$(3)="1010101FF0000000"
 :: X$(4)="081010907E111020"
120 X$(5)="080808F81F101010"
 :: X$(6)="0404C83810132020"
 :: X$(7)="02846418182621 40"
130 A$=RPT$(CHR$(100)&CHR$(1
01),13):: FOR R=1 TO 24 :: C
=C+1+(C=2)*2 :: DISPLAY AT(R
,C):A$ :: NEXT R
140 CALL VCHAR(1,29,1,168)
150 CALL SCREEN(2):: CALL CO
LOR(9,5,16):: FOR S=1 TO 8 :
: CALL COLOR(S,16,2):: NEXT
S
160 DISPLAY AT(5,5):" TIGERC
UB SOFTWARE ";:: DISPLAY AT(
8,6):" SQUIRMY SCREEN ";
170 FOR J=0 TO 7 :: CALL CHA
R(100,X$(J)):: CALL CHAR(101
,X$(7-J)):: NEXT J
180 CALL KEY(0,K,S):: IF S=0
 THEN 170
```

MEMORY FULL

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